Everyday emotion regulation: A mixed-methods investigation into how speech regulates emotion response systems

Olly May Beer

A DOCTORAL THESIS

Submitted in partial fulfilment of the requirements for the award of

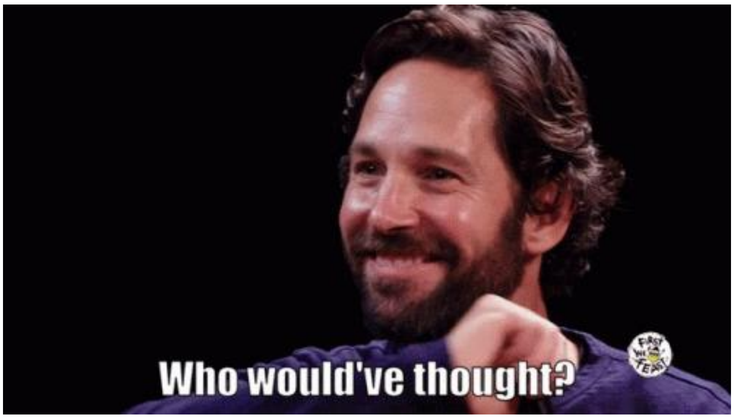
PhD in Psychology

June 2023

Keele University

Dedication

To Teenage Me.



Acknowledgements

Firstly, I must express my gratitude to my primary supervisor, Dr Richard Stephens, for the opportunity to undertake this body of research. I wish to thank him for his encouragement throughout the PhD process. Thank you for the freedom you have conferred in me to walk my own path to develop independence as a researcher and follow the many directions, and side hustles, that my interests have led me. Your fascination with the everyday is something that I will keep with me for a long time to come.

Thanks are due to Professor Alexandra Lamont, my second supervisor. Thank you for your big picture thinking. I must also thank Dr Sammyh Khan, who offered me sound guidance whilst on the supervisory team. I would also like to thank the Faculty of Natural Sciences at Keele University, for generously awarding me the studentship that enabled me to pursue a PhD.

Furthermore, I recognise, and am grateful for, the contribution of my participants, although they remain anonymous. Your stories, responses, questions, and feedback have not only shaped this body of work, they have shaped my development as a researcher. It has been an honour to have worked with each and every one of you.

I must also thank Andy Knipe, the senior technician in the School of Psychology, Keele University. Thank you for always being ready and available to help me and for collaborating on so many psychobiology laboratory adventures. Similarly, thank you to Emma Price, the outreach and development manager in the School of Psychology, who could always make my science outreach ideas a reality.

Thank you to Dr Simona Skripkauskaite and Dr Jenn MacCormack for your invaluable feedback on my thesis chapters. Simona, thank you for reviewing the analysis of Chapter Six to ensure credibility. Jenn, thank you for reviewing Chapter One to confirm the accuracy of my writing. I promise to continue the circle of ‘paying it forward’ in helping other doctoral researchers with their theses.

During my time as a PhD student, I had the privilege of collaborating with the incredible social psychology faculty at Tilburg University. I am eternally grateful to Professor Ilja van Beest for welcoming me to, and ensuring I was part of, the department. I do not believe I can put into words the depths to which your advice and the opportunity that you afforded me impacted my development as a scientist. Thank you for your support, guidance, and supervision for the work which comprises Chapters Six and Seven of this thesis.

Thank you to Dr Willem Sleegers, whose mentorship during my time at Tilburg University inspired me to become the problem-solving reproducible researcher I am today. Your guidance throughout the work completed for Chapter Seven was invaluable.

When thinking of the wider community at Tilburg University, many thanks are due to Erdem Meral, whose friendship (and wine) brought laughter, dancing, and critical thinking to my visit. Thank you to my other colleagues: Tony Evans, Bastian Jaeger, Byron Adams, Michael Bender, Hannes Rosenbusch, Celia Serrano-Montilla, Rawan Ghazzawi, Joeri Wissink, and the many other individuals to whom I am indebted for the lunchtime discussions, "coooooooffeeeee" breaks, Friday post-work drinks, and board game nights which enriched my Dutch life.

For three years of the PhD, I was heavily involved with PsyPAG. This was an experience that enhanced my doctoral studies and gave me an incredible support network that will (hopefully) span the rest of my career. I am so grateful for my (core) committee family who have always been on the other end of a Whatsapp message, ready to share righteous indignation, hilarious website malfunctions, and GIFs. Thank you Holly Walton, Ben Butterworth, Michael Scott-Evans, and Oli Clarke. We truly enjoyed the golden era of PsyPAG.

During my write-up period, I have been lucky enough to work with Dr Danielle Shore and Professor Cathy Creswell at the University of Oxford. I cannot express enough thanks to Danielle, whose friendship and mentoring allowed me to become confident in my meticulous and creative problem-solving abilities. I would also like to thank Cathy. From your mentoring, I know that I am capable and competent – a gift I do not take lightly. I am also especially grateful for Emily Day, Dr Jenni Fisk, Dr Sam Pearcey, Lucy

Taylor, Dr Tessa Reardon, Adrienne Shum, Helen Manley, Lindsey Martineau, and Dr Gemma Halliday from the TOPIC team and Sriraj Aiyer from the ACClab. I do not believe it to be hyperbole when I say that you are all the most wholesome people in academia. I can only hope to reflect the integrity, enthusiasm, and collegiality which you all so fully embody.

While the words will never express the sentiment adequately enough, I must thank my dearest friends, Kaylz Marshall, Millie Allen, Matt Jaquiery, and Maddi Pownall, whose friendship brings me joy in every moment and whose thoughts inspire me to awe. Without your unfaltering support, I would too often have been lost in a calamitous sea.

Of course, this section would be utterly incomplete without a devotional to my friends from Keele Psychology. To my dear friends: Emma Harrison, Claire Melia, Jamie Adams, Kara Holloway, Kim Dundas, Nicola Ralph, and Agi Kowalczyk. The warmth, joy, and unwavering love that existed in DH1.23 is without equal. I cannot imagine life without our commandeered drinks in the fridge, office plants, road trips, laser tag outings, and our consistency in winning every award possible at all Faculty functions (we are just too brilliant). Thank you for your fierce loyalty and for how you all knew I am enough just as I am. Thank you for walking this path with me. We have all become beautiful *footleflies*.

I must also thank my family – from both Beer and Robertson branches of the family tree – for their unwavering confidence, patience, and support. I am proud to be the latest (and best looking) Dr Beer/Robertson. I could only have gotten this far because of you and everything you have done for me. I can only hope to provide our families' next doctor(s) with the same kind and guiding presence as you have shown me.

Finally and most importantly, thank you to my husband Ali Beer. In the past decade we have shared, your belief in me has never wavered. Even when all seemed dark, you were nothing but light. Your steadfastness, good humour, and overall resilience to grumpiness has given me – and continues to give me – the courage to always try my best and to keep reaching for my dreams. I cannot convey the extent to which, in the vastness of space and the immensity of time, it is my absolute honour and

inexplicable good fortune to share a planet, an epoch, and a life with you. Without you, everything else is just confetti.

Now, let’s get to the science.

Abstract

Emotions shape and enrich our conscious experiences. Despite the interdisciplinary consensus that emotions are fundamental to understanding human behaviour, there are limited investigations into emotion and emotion regulation in the daily lives of non-clinical populations. The present thesis applied mixed methods over four studies to help bridge this knowledge gap and aimed to delineate whether, how, and why regulation occurs in daily life, focussing specifically on speech-based behaviours. Study One used semi-structured interviews and focus groups to explore how emotions are understood and regulated using speech in everyday life. Themes identified were emotions outside of speech; speech gives emotion form; and speech as emotion regulation. Speech behaviours identified by participants as providing effective emotion regulation – venting and swearing – were selected for further empirical study. The quantitative phase of the thesis involved two studies investigating whether and how venting and swearing may regulate emotions and was supplemented by a third study which developed and validated a new translation of an emotion measurement scale for the experimental work. In Study Two, venting in response to social ostracism was not found to impact either subjective experiential or physiological emotion response systems when compared to not venting. In Study Four, repeating a swearword was found to increase heart rate variability – a theorised index of parasympathetic nervous system activation and a physiological emotion response system – compared to repeating a neutral word. Swearword repetition did not impact subjective experiential response systems compared to neutral word repetition. The work taken as a whole makes a substantial contribution by documenting how the inclusion of lay voices strengthens and improves emotion research and by evidencing that speech may fulfil adaptive emotion regulatory functions in response to social ostracism.

Contents

Chapter One: Literature Review

Emotions are a seminal aspect of human existence, shaping and enriching our conscious experiences across the lifespan (Barrett, 2017a; LeDoux & Brown, 2017). Despite the interdisciplinary consensus that emotions are fundamental to understanding human behaviour (Hutchinson & Barrett, 2019; Lambie & Marcel, 2002), there are limited investigations into emotion and emotion regulation (ER) in the daily lives of non-clinical populations. Rather, theoretical assumptions about emotion tend to be extrapolated from research based either on clinical populations or from lines of enquiry with limited external validity. These studies focus on specific paradigms which are easily operationalisable but are not evidenced to reliably occur in daily life (Ford et al., 2019). Thus, it is clear that the existing scientific field is characterised by large amounts of empirical publications but limited insight into actual human behaviour.

Negotiating the incongruence between published theoretical assumptions and lived experiences of emotion and regulation is a core focus of this thesis. Whilst extant work has undoubtedly provided an important foundation from which emotion research can be generated, I will argue that it has created a large gap in ER knowledge. Specifically, emotion research is lacking in three critical respects. Firstly, (1) a fuller understanding of perceptions and actual instances of emotion experiences and the associated regulatory behaviours are required to inform definitions of each construct and their empirical investigations. As described above, most ER research to date focusses on a specific set of paradigms or regulatory strategies, despite there being evidence to suggest that such paradigms/strategies do not occur within everyday life for most individuals (Gross et al., 2006; for further discussion see 1.3). The present thesis contrasts most published literature to date by using a bottom-up approach to build upon theoretical models of ER and to design complex paradigms which reflect actual human behaviour, thus meeting the first identified gap.

Secondly, (2) measures of ER that capture various dimensions of emotionality and intra-individual fluctuations are needed to represent the complex dynamics of emotion experience and regulation. For example, when measuring emotion for specific strategies, self-report values for either negative or positive emotions have tended to be captured, rather than a holistic measure of the entire potential emotion experience (e.g. Kaholokula et al., 2017; for further discussion see 5.4), thus rendering the information available about ER incomplete for many strategies. In the present thesis, I adopt a multi-modal method of measuring emotion, using both positive and negative emotion self-report values, as well as psychophysiological measures, to address this gap specifically.

Furthermore, within this thesis, I investigate how speech-based ER occurs in non-clinical populations as a response to negative social stressors. These investigations use measures of peripheral physiology and subjective experience to test specific hypotheses about the biological and cognitive underpinnings of ER and their implications for emotional wellbeing, thereby meeting the second gap.

Thirdly, (3) contextualised mechanistic models of regulatory behaviours used by non-clinical populations are under-investigated. Speech, for example, is a behaviour that occurs following 80% of emotional events (Nils & Rimé, 2012), but the potential regulatory properties of speech are seldom investigated within empirical work. This thesis will meet this third gap by formulating a proposed mechanism underlying speech-based ER through a qualitative paradigm (Chapter Three) and testing this empirically through quantitative experiments (Chapters Five and Seven).

This chapter will provide a review of the empirical literature, relating both to emotion and ER research, to situate the research within the wider field and to provide the context and rationale which supports the aims of the thesis. Within this first chapter, I outline the key properties of emotion which are agreed upon unanimously across the field of affective science (1.1). I will then review existing work that articulates the concepts and processes of emotion from varying theoretical perspectives, culminating in an overview of the theoretical framework of the present thesis (1.2). I will then consider how specific forms of ER, specifically that of speech-based ER, are understood theoretically and applied to meet an individual's goals and needs across contexts (1.3). Following this review, the specific research questions and aims for the present thesis will be introduced (1.4). Subsequently, an overview of the remaining chapters will be provided (1.5).

1.1 Emotion Response Systems

The process of identifying emotion response systems has been likened to the course of events in the parable of the blind men and the elephant (Hoemann, 2020). In this parable, each man touches a different part of the elephant to learn and conceptualise what it is like, with each proclaiming that the elephant has conflicting, distinct properties. This is a powerful analogy for how emotion – understood here as our elephant – is recognised differentially across theoretical perspectives depending upon how the construct is operationalised and measured. A review of emotion definitions suggested that there are over 100 working definitions that differ based on their emphasis of divergent emotion response systems, for instance, an overemphasis on physiological concomitants or instead on expressive behaviours (Kleinginna & Kleinginna, 1981). The lack of definitional consensus is problematic as, in both historical and empirical literature, emotions are defined by their properties (McRae & Gross, 2020) and these definitions inform measurement processes and empirical inferences (Prescott, 2017). Within contemporary perspectives, however, five aspects have consensus across theories and which support a loose, but widely accepted, definition of emotion (Scherer & Moors, 2019). Specifically, emotions are agreed as being: situationally bound; time-limited; valenced; able to induce change to an agent's physiology; and able to change an agent's behaviour (Barrett et al., 2007; Coppin & Sander, 2021). I will briefly discuss each of these in turn and then use these components to review current theoretical perspectives of emotion and outline the theoretical framework of the current work as the minutiae of emotion generation and measurement differ across theoretical stances (for further discussion of the epistemological position of the thesis see

Chapter Two). However, *in precis*, using these systems, emotions are defined as functional neurophysiological events experienced to varying degrees of pleasantness or unpleasantness which prepare the body for action based on available contextual and temporal cues (Barrett & Adolphs, 2021; Frijda & Scherer, 2009)

1.1.1 Emotions are Situationally Bound

The proposal that emotions are situationally bound is uncontroversial (Scherer, 2009). Emotions are assumed to be elicited when psychologically relevant events occur in the individual's internal or external environment, and cannot arise independently without stimuli (P. Kuppens & Verduyn, 2017). What constitutes a relevant event has been broadly defined in the emotion literature and may describe emotion triggers (Carroll & Russell, 1996), body postures (Meeren et al., 2005), visual scenes (Aviezer et al., 2008), social interaction (Abramson et al., 2021), and situational features (Barrett et al., 2011). Irrespective of the nature of the psychologically relevant event, the emotion-generative process is theorised to be sequential, occurring as follows: (1) encountering or selectively attending to a psychologically relevant situation (*situation*); (2) attending to key stimuli within the given situation (*attention*); (3) predicting psychological and physiological adaptation to meet future demands (*appraisal*); (4) and inducing change to subjective experiential, physiological, and/or behavioural components (*response*; Baltazar et al., 2019; McRae & Gross, 2020; see Figure 1.1). For example, during a PhD viva (situation), the given PhD candidate notices the pregnant pauses between discussion points with examiners (attention), the candidate interprets these pauses as displeasure with the research (appraisal), and consequently experiences anxiety, shortness of breath or nervous sweating (response). This cycle then repeats using the output of the preceding sequence as the starting parameters, which is that the situation is now the PhD candidate sitting in a viva while feeling anxious, having shortness of breath, and feeling sweaty. Thus, following each sequence iteration, emotions are elicited and defined by the governing social and environmental context. Whether these sequences are understood as single discrete responses which govern future potential responses or as dynamic events which evolve over time depends on the theoretical understanding of emotion adopted (see 1.2.1.1 and 1.2.2.1 for discussion).

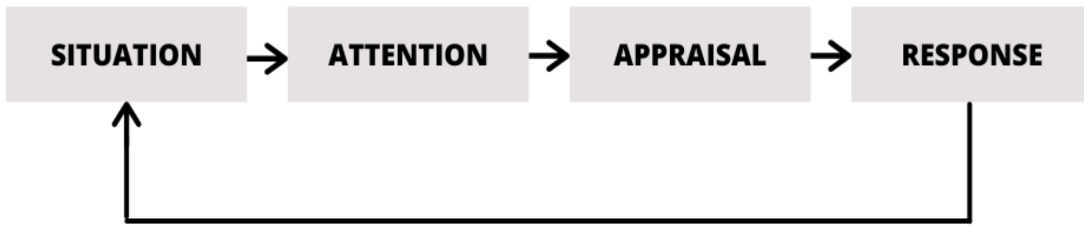


Figure 1.1. The sequential model of emotion generation. Feedback arrows indicate that all three stages are constantly iterating cycles. Figure redrawn from McRae and Gross (2020, p.2).

1.1.2 Emotions are Time Limited

It is assumed within the emotion literature that emotions are inherently time dynamic (Dejonckheere et al., 2019). The time course over which emotions are generated varies across emotional states and eliciting contexts, but emotions are definitively transitory (Parkinson et al., 1996). As such, emotions are distinguishable from moods (Beedie et al., 2005). The trajectory of moods can extend across days depending on individual and environmental trait parameters. Conversely, the temporal resolution of emotions is delineated by a recursive sequence of appraisal and generation/maintenance allowing for fluctuations in emotional episode duration (Sheppes & Gross, 2011). The temporal resolution of emotional episodes - a phenomenon known as affective chronometry - is highly variable, with durations ranging from seconds to hours (Verduyn et al., 2015). Affective chronometry may be estimated using various variables, such as response latency (i.e. time between onset and peak intensity), time window (i.e. milliseconds, seconds, etc.) and recovery time (i.e. time for an emotion to dissipate). While the predominant experimental paradigm in emotion research has been the use of static stimuli and measurements, such as static images of facial expressions, without dynamic measures of affective chronometry the ecological validity of emotion research has been called into question (McKeown & Sneddon, 2014). Despite the options available for measuring affective chronometry, the temporal measurement of emotion is limited by emotion definitions and theories ((Jager, 2021; see 1.2.1.2 and 1.2.2.2 for discussion).

1.1.3 Emotions are Valenced

Valence refers to the hedonic tone – the pleasure-displeasure dimension – of emotion (Barrett, 2006). Valence is a descriptive property of an emotion (Barrett & Westlin, 2021), and may be described as good-bad mood (Ortony & Turner, 1990), pleasure-pain (Solomon & Stone, 2002), approach-avoidance (Davidson, 1992; Lang & Davis, 2006), or rewarding-punishing (Barrett, 2006). Ultimately it is underpinned by the qualitatively different tones of positivity and negativity (J. A. Russell & Barrett, 1999). Accordingly, some emotions are positive in tone, such as happiness, and some negative, such as sadness. This response system is often referred to as the subjective experience, that is, the 'feeling' aspect which occurs during an emotion event (Coppin & Sander, 2021) and which has been measured in the majority of all experimental studies of emotion experience (Barrett & Westlin, 2021). Models which explain the subjective experience of emotion vary depending on the epistemological stance of the researcher and, as such, measurement processes differ across conceptualisations of valence (see 1.2.1.3 and 1.2.2.3 for discussion). For example, while some theorists hold that valence is dictated entirely by the emotion elicited (e.g., sadness is always negative in tone), other theorists hold that individual and situational differences determine valence tone within emotion categories. Thus, it is critical to outline how valence is conceptualised to appropriately measure emotion.

1.1.4 Emotions Have Physiological Reactions

It has long been presumed that different emotional states involve specific and distinct patterns of autonomic nervous system (ANS) activation (James, 1948). The ANS is a general-purpose physiological system that is responsible for modulating peripheral functions (Öhman et al., 2000). This system is comprised of sympathetic and parasympathetic branches, known as the fight-or-flight and rest-and-relaxation responses respectively (Mauss & Robinson, 2009). Activation of either the sympathetic or parasympathetic branches of the ANS is hypothesised to ready the body for action to manage the emotion eliciting situation. Most measures of emotion moderated patterns of ANS activation use cardiovascular (e.g., heart rate variability) or electrodermal (e.g., skin conductance) measurements. These measures are assumed to reflect sympathetic activity (e.g. skin conductance), parasympathetic activity (e.g., heart rate variability), or a combination of both sympathetic and parasympathetic activity (e.g., heart rate), thus allowing for inferences related to differential ANS activity to be made in emotion research. Models explaining whether a relationship between an instance of an emotion and ANS activity exists and, if so, to what level of specificity depends on the theoretical perspective of the researcher (see 1.2.1.4 and 1.2.2.4 for discussion).

1.1.5 Emotions have Behavioural Tendencies

The suggestion that emotions are associated with actual or readiness to behave in certain ways is not a novel one (e.g. Dewey, 1895). Emotions are believed to prepare the individual to act to meet specific aims (e.g. to promote survival by running away, to induce action in others by crying). These behaviours are proposed to be so recognisable that artificial intelligence or machine learning algorithms can recognise and forecast an individual's state emotion (e.g. Bartlett et al., 2006; Minaee et al., 2021). Despite such an assertion, like all emotion response systems, the extent to which behavioural tendencies are deemed to be predictable across and within emotion categories vary across theoretical positions. For instance, while some perspectives outline clear prototypical models for each emotion, others treat the association between an emotion and the behavioural concomitant as a mysterious entity (Moors & Fischer, 2019). Furthermore, the function of behavioural responses are appraised to have different eliciting mechanisms and purposes between epistemologies (see 1.2.1.5 and 1.2.2.5 for discussion).

1.1.6 Emotions Response Systems and Empirical Study

As previously discussed, emotions are understood to be multisystem events characterised as being situationally bound, time-limited, valenced, and associated with physiological and behavioural concomitants. However, how these systems are understood in terms of operationalisation, measurement, and empirical inferences vary across theoretical positions. Each theoretical position conceptualises each property differently and attributes different weighting to the importance of each component (Scherer, 2019), thereby deriving a differential definition and understanding of emotion. This is problematic in terms of research as, without careful consideration of the properties and clear definitions of emotion, studies may not advance scientific understandings of emotion (Reisenzein, 2019). The lack of careful consideration to date has been termed the *original sin* of emotion research (Scarantino, 2005). It has been suggested that to fully understand the process models and mechanisms underlying emotion events and associated qualia, one must delineate the components of an emotion in line with theory so that the most appropriate measurements and operations are used (Moors & Fischer, 2019). It has been argued that without clearly theoretically informed empirical emotion research, further knowledge loss and fragmentation will occur within the domain of affective science (Reisenzein, 2019). As such, emotion research must be situated within a theoretical framework to design paradigms that are impactful and of use to the wider field.

1.2 Emotion Theories

While the above properties are held across epistemological positions, the minutiae of emotion generation and maintenance, as well as the proposed best methods of measurement, are highly debated among emotion theorists. Theories of emotion tend to fall into a dichotomy of discrete vs. populations perspectives. Discrete accounts of emotion, such as Basic Emotion Theory (Ekman & Cordaro, 2011), hold that an emotion, such as happiness, exists as a distinct pancultural and functional state. These discrete emotions allow for adaptive and efficient universally homologous behaviours to evolutionarily significant opportunities and challenges (Ekman, 1992). Populations theories, such as the Theory of Constructed Emotion (Barrett, 2017b), posit that specific emotion words (i.e. happiness) refer to a *population* of highly variable instances of neurophysiological events, each of which is shaped to the situation or context (Barrett, 2022). It is posited that an emotion is not a distinct entity with firm boundaries, but a category of instances that are culturally diverse based on each emotion's utility in socially relevant situations and available linguistic markers. In essence, between the two perspectives, the issue is whether or not an English word such as 'happiness' refers to a physical type – a category whose instances share a distinctive neurophysiological and behavioural pattern homologous across cultures and which is sufficiently similar across contexts and instances. In this section, I will discuss the prominent theories of Basic Emotion Theory and the Theory of Constructed Emotion. After briefly introducing each theory, I use the outlined components (seesection 1.3.1 for exemplars) and then draw on divergent but theoretically relevant empirical research to evaluate the evidence available supporting each position.

The Trust, Abstraction, Progress, and Applicability as Standards (TAPAS) model (P. A. M. van Lange, 2013) will be used to evaluate the value of both theories to substantiate the theoretical framework of the present thesis (for further discussion of the epistemological position of the thesis see Chapter Two; for further review of other emotion theories, see Fox et al., 2018). To test and use such theories as research frameworks, it has been suggested that the TAPAS Model should be employed for evaluating emotion theory and the associated research (Rothermund & Koole, 2020). The TAPAS Model holds that to be tenable, a theory should: be orientated towards truly explaining reality (truth); should explain specific phenomena in terms of basic principles and causal mechanisms (abstraction); progress scientific knowledge relating to the phenomena (progress); and speak to real-world concerns and afford impactful interventions (applicability).

1.2.1 Basic Emotion Theory

Basic Emotion Theory (BET; Ekman, 1992) suggests that emotions are not culturally determined but are universal across humanity, and are thus biological in origin. Ekman's (1992) BET holds that there are a limited number of emotion states which are biologically and psychologically primitive (Keltner, Sauter, et al., 2019); meaning that emotions map onto functional neurophysiological and anatomical substrates and that all feeling states are built upon sets of fixed emotions (Ortony & Turner, 1990). The biologically primitive structures are theorised to generate coordinated experiences of perception, phenomenological elements, response tendencies, expressive behaviours, and physiological responses which are recognisable across the sets of psychologically primitive emotions (Tracy & Randles, 2011). It is suggested that instances within the same emotion category share a degree of typicality, allowing for clearly identifiable between-category variation. For example, in concrete terms, prototypically labelled, nominal emotions within the category of 'anger' – emotions such as frustration or rage – will share similar patterns of physiological reactions (e.g., blood pressure changes), expressive behaviours (e.g., facial expressions), and valence profiles (e.g., negative) which vary distinctively from emotions within other emotion categories (e.g., 'sadness') in a manner that partitions each emotion category definitively from one another (Ekman, 2016; see Figure 1.2). Each emotional state is theorised to have evolved primarily to support adaption to evolutionarily important events within the individual's environment.

It is of note that, according to Ellsworth (2014), the six basic emotions outlined in BET were derived by chance. Due to a lack of time in designing an experimental paradigm, the six emotions associated with BET (e.g. anger, sadness, joy, disgust, fear, and surprise) were chosen based on their ease of operationalisation rather than from theoretical deductions. As further research based on the canonical six emotions proliferated through the scientific literature, these emotions were seen as definitive and have since been canonised within psychology. This canonisation has been resistant to change, with the six emotions enduring throughout the latter half of the 20th century and the beginnings of the 21st century. Where researchers have tried to include other emotions into the canonised basic emotion taxonomy, such as regret (Zeelenberg, 2018), they have been met with resistance or derision. While BET has undoubtedly shaped scientific understandings of emotion since the 1960s, the available evidence suggests that the foundations of BET are unreliable or unsupported by empirical evidence. Indeed, according to Erika Rosenberg (E. Rosenberg, personal correspondence, August 4 2020; Appendix T) – who is the "protégé and long time [sic] collaborator" of Paul Ekman – many statements made by Ekman about emotion theory are based on his reflections "living in the world", thus suggesting that many tenets of BET may not be replicable or evidenced empirically. Despite this concern, BET remains a prevalent theory of emotion.

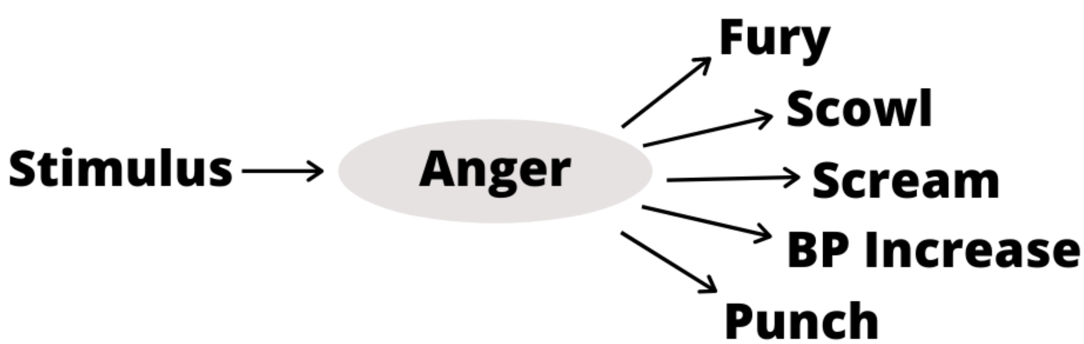


Figure 1.2. The causal and measurement model for BET. *BP*, blood pressure. The causal, latent mechanism (the emotion) is depicted in the grey oval. The resulting exclusive, measurable outcomes are indicated on the right. This model assumes that an emotion is a reflex triggered by an emotional stimulus that results in coordinated output that unfold over time. Figure redrawn from Barrett & Westlin (2021, p.39).

The succeeding sections will now outline how BET explains the five core aspects of an emotion (situational; temporal; valence; physiological; and behavioural) using theoretical and empirical evidence.

1.2.1.1 Situational Component of Emotions

According to BET, the six emotions of anger, fear, joy, surprise, fear, and disgust are functional states (Ekman, 1992). In line with this view, emotions are theorised to be intimately related to evolutionarily survival-critical functions (Levenson, 2011), with each emotion addressing a particular challenge or opportunity which is critical to species survival. For instance, anger has been suggested to motivate an individual to attack an antagonist to maintain social standing or to protect important resources (Tooby & Cosmides, 1990). Similarly, fear has been theorised to drive attention towards a potentially threatening stimulus and induces an automatic series of avoidance behaviours that promote survival, such as running away (Öhman et al., 2001). Thus, basic emotions are proposed to be elicited by evolutionarily relevant stimuli within the given context (Keltner, Sauter, et al., 2019).

The concept of basic emotions fulfilling adaptive purposes based on evolution has been described as teleology (Barrett, 2017b). Teleology is the assumption that a process (i.e. emotion) was designed (i.e. based on evolutionary requirements) to serve an adaptive (i.e. functional) purpose, often with little evidence available to support the assumptions (Kelemen et al., 2013). Within teleological inferences, metaphorical language is frequently used to ascribe causation of behaviour in a manner that cannot be tested empirically and for which the mechanism is hypothetical (e.g. eyes widen *in fear* to increase vigilance and detect possible threats). The use of metaphors can be seen in the conclusions made by Öhman and colleagues (2001), where fear is the causal driver of identification and response processes when participants were presented with images of snakes. While teleological metaphors may facilitate reasoning and understanding of emotion, they become problematic when these metaphors are taken as factual statements regarding causality. The proliferation of teleological inferences is particularly problematic for BET as explanations of emotions are habitually offered without much-supporting evidence and are, instead, dependent on the interests and proclivities of the individual researcher (Barrett, 2017b; Ellsworth, 2014). Generalised arbitrary, but plausible, accounts have historically been provided for each basic emotion category leading to literature replete with poorly supported heuristics and an essentialist view of emotion (Zachar, 2022). In emotion theory, essentialism is the belief that each emotion has an underlying and immutable essence that categorises and defines it into a different, internally homogenous kind that is invariant (Berent et al., 2020; Boiger et al., 2018). It may be argued that BET assumes an essentialist position, arguing that the 6 basic emotions are constant across time, species, and place.

When the essentialism inherent within, and the teleology underpinning the evolutionary basis of BET are taken together, I argue that BET cannot fully explain how emotions are elicited in everyday situations. Furthermore, it is not clear how emotion elicitation paradigms can be robustly constructed using BET as a framework. This is of particular importance for the present research because, as previously discussed, without a theoretically sound framework, emotion research is likely to result in knowledge fragmentation or will not reflect actual effects (Reisenzein, 2019).

1.2.1.2 Temporal Component of Emotions

According to BET (Ekman, 1992), emotions are differentiated from reflexes, and moods based on their temporal nature. Ekman (1984) argued that temporal duration is a defining aspect of an emotion. Assumed to be brief, the duration of an emotion is theorised to occur across seconds or minutes; with most instances of an emotion theorised to last between 500ms and 4 seconds (Ekman & Friesen, 1982). The latency of an emotion may extend beyond 4 seconds, however, depending on the nature of the eliciting stimulus (Ekman, 1984). This assertion has not been expanded upon in the literature and, as such, the latency profiles of emotions according to BET are unclear. Conversely, according to Ekman (1984), reflexes last a maximum of 500ms and moods may endure for hours. Thus, emotions are demarked by their brief nature but, due to the dearth of literature on this topic, it is difficult to expand further on the temporal component of emotion. However, any research underpinned by BET must take into account the short temporal nature of emotions when considering best measurement practices.

1.2.1.3 Valenced Component of Emotions

Proponents of BET would argue that an emotion's valence cannot be divorced from the emotion category (Colombetti, 2005). That is, sadness is always negatively valenced in tone and, conversely, happiness is always positively valenced in tone (Panksepp, 2005). Accordingly, positively and negatively valenced emotions are theorised to be elicited by positive and negative events (Bradley & Lang, 2000), film clips (Davidson, 1998), and photographs or images (Riegel et al., 2016). Thus, according to BET, emotion elicitation paradigms can reliably induce a target emotion by asking an individual to attend to a stimulus deemed to embody the target basic emotion.

There are limitations to this approach. It assumes that all individuals appraise each stimulus in the same manner (Ekman, 1994). That is, a stimulus that is *a priori* assumed to elicit happiness, such as an image of a puppy, may not spark joy in an individual who is fearful of dogs or in someone who would describe themselves as a 'cat-person'. I argue that there is, at best, the introduction of variability as error variance into an empirical paradigm due to this limitation, because each individual varies in the degree to which their appraisal aligns with the given basic emotion category. Ultimately, situations or eliciting stimuli are not inherently negative or positive. The emotional concomitants which result from emotion elicitation are dependent on individual-level factors, such as being a 'dog-person' or 'cat-person' in the previous example. Thus, BET's *a priori* assumption that emotions and their eliciting stimuli are inherently valenced and cannot be divorced from one another is inherently flawed and does not provide a robust foundation upon which to base empirical research.

1.2.1.4 Physiological Component of Emotions

Each basic emotion category is theorised as having dedicated evolutionarily preserved neurophysiological substrates which coordinate the activation of a suite of responses involving alterations to the individual's neurophysiological and somato-visceral state, including musculoskeletal responses (e.g. changes in muscle tone) and ANS changes (e.g. changes in hart rate). Such activation is presumed to be highly similar, if not consistent, across instances of the same emotion category which can be used diagnostically to differentiate emotions from one another (see discussion and critique in Siegel et al., 2018). For example, in a study investigating emotion-specific ANS activity (Levenson et al., 1991), 20 participants were asked to recall an event that would induce a target basic emotion (e.g., recalling the death of a family member or close friend to elicit sadness). Heart rate and finger temperature were recorded throughout, with ANS reactivity indexed using computed change from baseline. The results indicated that anger was associated with increased heart rate, sadness with increased heart rate and finger temperature, and fear with decreased finger temperature. The authors concluded that certain emotions have differentiated and consistent ANS activity that is innate, meaning it spontaneously emerges without being learnt. The documented changes were specifically connected with evolutionary constructs, such as increased need for action in situations that elicit anger, thus necessitating the increased heart rate. However, there was no evidence provided with which to support these claims beyond a conflation between emotion experience and the 'fight-or-flight' response.

It is noted that in the above study (Levenson et al., 1991) there were only 20 participants recruited for this research, meaning that the study was likely underpowered to detect an effect and may have instead evidenced Type II error. This is important to consider when evaluating Ekman's deductions of the physiological component of emotions as most of his research in this area had small sample sizes and may be similarly underpowered (e.g., Ekman et al., 1983, *N*=16; Levenson et al., 1991, *N*=20; Levenson et al., 1990, *N*=20); thus I argue that the extent to which Ekman's work fully explains physiological emotion components is not clear. Indeed, here more advanced and robust methodological approaches of multivariate pattern recognition have been used, such as machine learning techniques focussing on identifying regularities within data patterns across large data sets (Nummenmaa & Saarimäki, 2019), or meta-analyses are undertaken (Siegel et al., 2018), evidence suggests that neurophysiological activity occurs as wide-spread, system-level patterns of activity, rather than as selective regional or category-specific activity. Thus, when robust methodologies are used it seems that any evidence of ANS reactivity for a given basic emotion category disappears. If this is true then according to BET, basic emotions may not be best explained using the current framework that differentiates emotions as a separate adaptive function but would rather be best explained as a neurophysiological event akin to all other cognitive functions (i.e. Barrett & Adolphs, 2021).

I have previously discussed how BET's theoretical assumptions have, predominantly, been made based on the results of methodologically flawed research and essentialist teleological assumptions (see 1.2.1.1). This argument is also extended to the assumption of a biological blueprint for emotion. In terms of essentialist teleological assumptions, I argue that we should not expect different ANS signatures for each emotion. Ekman (2005) stated that the physiology of the body should reflect optimal preparation to adaptive action and that a lack of a specific pattern of activity means that the emotion is not an evolved survival mechanism, and thus not an emotion. I suggest that many functions have evolved to promote survival, such as memory (e.g., Sherry & Schacter, 1987), which do not require ANS activation or which do not have distinct, specific patterns of ANS activation.

In summary, there is little robust evidence that supports BET's assumption that emotions have distinct patterns of neurophysiological activation. Rather, the empirical evidence suggests domain-general patterns of activation which do not provide specific diagnostic activation patterns based on emotion category. Accordingly, in terms of other evolved cognitive adaptions, there is no *a priori* assumption that specific patterns exist for each adaption and, as such, it remains unclear why emotions should be special or different in this regard. These concerns are of particular note for the present research which analyses psychophysiological measures of emotion to assess ER efficacy. Where the theoretical framework is lacking, it follows that the research may not be robust. As such, it is not clear how BET would allow for the present work to produce high-quality results which provide accurate representations of reality.

1.2.1.5 Behavioural Component of Emotions

BET assumes that each instance of an emotion has its own physical essence which distinguishes it from other emotions. To date, the majority of evidence supporting BET using behavioural emotion response systems has been derived from research using prototypical facial expressions. Prototypical facial expressions refer to the precise configurations of facial muscle movements, known as action units (AUs), which consistently signal specific emotion categories and provide an algorithm through which interaction partners can express and interpret otherwise unknowable emotional qualia (Barrett et al., 2019). As the facial muscles associated with prototypical facial expressions of emotion have been argued to occur universally in humans (D'Andrea & Barbaix, 2006; Waller et al., 2008), it has been suggested that these muscles and the associated AUs allow for the expression of emotions which are universally recognisable.

Despite this seemingly intuitive suggestion, the evidence available does not support such a hypothesis. A meta-analysis (Durán & Fernández-Dols, 2021) of 55 studies that examined the extent to which facial muscle movements predicted the corresponding basic emotion found low effect sizes for whole facial muscle configurations ($M_{\text{EffectSize}}$=0.13) or partial configurations ($M_{\text{EffectSize}}$=0.23). When moderating variables, such as eliciting stimulus or AU coding system, were included in the model, there was no evidence of a consistent pattern to explain observed facial muscle movements. The authors concluded that there are no reliable patterns of facial muscle movements that cohere to the canonical six basic emotions. Thus, it is reasonable to suggest that the evidence does not support the hypothesis that each emotion has its own behavioural blueprint from which emotion can be diagnosed or recognised.

1.2.1.6 Evaluation of BET using the TAPAS methodology

To assess the tenability of BET as a theory, the evidence discussed above (see section 1.2) will now be assessed using the TAPAS model (P. A. M. van Lange, 2013). The TAPAS model evaluates theoretical formulations for their standards of truth, abstraction, progress and applicability. Such an approach is suggested to promote replicability and reproducibility in emotion science, which will ultimately progress our understanding of emotion further (Rothermund & Koole, 2020).

Truth.

A central tenet of theoretical frameworks is to pursue truth (van Lange, 2013). That is, a theory aims to accurately reflect phenomena and to separate fact from fiction. According to Ellsworth (2014) and the Ekman Group (E. Rosenberg, personal correspondence, August 4 2020), the foundations of BET are based on personal reflections and chance selection of emotion categories, rather than on empirical investigations or theoretically informed paradigms. As such, it is unclear the extent to which BET reflects reality and how much it reflects Ekman's assumptions and interpretations of the world. As discussed above, as most empirical findings used to support BET, such as facial expression production and recognition (e.g., Ekman, 1965), are not supported by meta-analyses, there is limited evidence that the theoretical framework reflects true reality.

Abstraction.

According to the TAPAS model, a theory should be able to describe and evidence the particular phenomena or events in general or easy-to-understand terminology, and it should be able to integrate itself into other complementary theories (van Lange, 2013). A key component of abstraction is achieving parsimony (van Lange, 2013). Parsimony is where many events or phenomena are explained in terms of a relatively small number of higher-level constructs and is suggested to counteract fragmentation of psychological and emotion theories (Lange et al., 2020; Moors, 2017).

BET excels at formulating clear causal mechanisms of emotion based on evolutionarily important stimuli (Ekman, 1992). Despite the clarity in explaining key causal mechanisms, there is limited evidence to support the formulations as they are predominantly based on teleology (Barrett, 2017b). The underlying assumptions of these causal mechanisms seem to be based on unsupported personal reflections and have been canonised by their proliferation by Ekman and colleagues' work in the latter half of the 20th century (e.g., Ekman et al., 1969; Ekman, 1965, 1984, 1992, 1994, 2005). While at face value BET seems to meet the requirements of abstraction for evidencing a theory using general terminology, the abstraction is not clearly supported by evidence (see section 1.2.6.1); rather it is supported by metaphors and teleology.

Due to the lack of robust or consistent evidence from empirical evidence to support BET, I do not believe parsimony can be achieved. For example, research exploring ANS reactivity in paradigms that elicit basic emotions have been unable to demonstrate distinct or reliable patterns of reactivity (e.g. Nummenmaa & Saarimäki, 2019). I also do not think there is evidence to suggest that, from a theoretical perspective, it is parsimonious to have a set of discrete, separate neurophysiological modules for each basic emotion, such as specific neural circuitry. This level of specificity is biologically inefficient and is thus probably not a parsimonious model of neurophysiological function or architecture. The evidence suggests that it is not possible to easily integrate BET into other psychological theories due to the lack of consistent evidence and the limited success it has with evidencing its own assumptions.

Progress.

The TAPAS model (van Lange, 2013) holds that to ensure progress a theory should continuously expand our existing knowledge of phenomena, with older theories continuously refined and sharpened to maintain progress. Despite the proliferation of BET in psychological literature, there has been little progress made in emotion science with researchers perseverating on the taxonomy approach of basic emotion categories. Similarly, there has been little evidence of refinement of BET, with proponents resistant to refining the theory through changing the proposed emotion categories (e.g. Zeelenberg, 2017) or adapting itself towards a contextual or dynamic approach (Barrett & Satpute, 2019). In concrete terms, this has meant that emotion science has historically tried to evidence differences between emotion categories (e.g. facial expression composition differences between joy and disgust) using the same paradigms and assumptions which have previously yielded inconsistent results; specifically perseverating on film-clip and image exposure paradigms, despite the lack evidence that these paradigms work as intended or yield inconsistent results (e.g., Alghowinem et al., 2019; Olegario et al., 2021). Based on the lack of replicability, it has been argued that the approach taken thus far by proponents of BET have not produced a generalisable and generative model of emotion (Barrett & Satpute, 2019).

Applicability.

For a theory to meet the standard of applicability, it should speak to many events and issues in everyday life across time and place (van Lange, 2013). However, BET is unable to explain many commonplace phenomena, such as heart rate changes in emotional contexts (i.e. Nummenmaa & Saarimäki, 2019). Indeed, the application of BET to real-world scenarios facial data algorithms for emotion recognition may have led to actual harm.

Facial data algorithms, that is software that identifies emotions based on the similarity to AU activation associated with prototypical emotional facial expressions, largely reflect racialized and gendered biases. For example, one study (Rhue, 2018) analysed professionally posed images from 400 male National Basketball Association players using emotion analysis modules of Face++ and Microsoft AI facial recognition software. The results found that players racialized as Black were three times more likely to be displaying contempt and fear, and two times more likely to be expressing anger than players racialized as White. Conversely, players racialized as White were 20% more likely to be identified as expressing happiness compared to players racialized as Black. The method of analysis is thus limited, as insufficient consideration is given to the cultural differences and contextual information required to accurately identify any given emotional state. Rhue (2018) argued that, from this analysis, a reliance on the current prototypical model of emotion expression is likely to disproportionately burden individuals from the Global Majority who are required to conform to Eurocentric assumptions about how emotions *should* be displayed on the face. Where challenges are not made to understandings of prototypical emotional facial expressions, these colonialist and harmful ideas may continue to be propagated and incorporated into future algorithms, thus ensuring the propensity for further harm.

Considering this evidence, it seems that BET does not adequately explain or model behaviours relating to emotion expression. Moreover, it may have led to actual psychological harm and the propagation of racist stereotypes for individuals from the Global Majority. This is a potential concern as the use of colonialist and harmful theories in research serve to further support such structures. Thus, the applicability of BET is low.

Conclusion.

While Ekman's influence and importance to the field of affective science cannot be understated, according to the analysis above using the TAPAS methodology, BET does not meet the outlined standards. As such, I argue in the present thesis that BET does not adequately explain emotions nor does it provide a stable theoretical foundation upon which emotion research should be based.

1.2.2 Theory of Constructed Emotion

In contrast to BET is the constructionist model: the Theory of Constructed Emotion (TCE; Barrett, 2017a; 2017b). The TCE assumes that events labelled 'anger', 'joy', 'fear', etc., are not discrete, distinct, basic *building blocks* of the mind, but rather are compounds of a myriad of domain-general cognitive and psychological processes (Lindquist et al., 2015). Through degeneracy – a term which refers to the capacity of the human brain to use dissimilar representations or structures (e.g., separate sets of neurons) to generate instances of the same category or function (e.g., joy) in differing contexts (G. M. Edelman & Gally, 2001) – emotions are formed through multiple spatiotemporal patterns of activation in varying neurophysiological substrates (Barrett, 2017b). Thus, rather being defined by their unitary features, such as a single facial expression or psychophysiological signature (e.g., change in heart rate), emotions are abstract conceptual categories which are grouped by either their goal orientation or their situated, functional processes (e.g., adapting to physical danger situations or social evaluation situations; Hoemann et al., 2020). Hence, there may be equal levels of within-category variation across instances of the same emotion, as exists in variation between categories of emotion instances. In concrete terms, this means that there may be as much variation in cognitive, physiological, and behavioural processes in differing instances of joy as there are between instances of joy and fear. In line with this assumption, according to TCE, variation is the norm in emotion events and most changes in response systems are only predictable based on the associated goals or situated functions, not the emotion category itself.

According to the TCE, emotions are created when the brain takes the current conditions (e.g., incoming sensory signals, be they internal from the body's current state or external such as a friend's facial expressions; see Figure 1.3) and creates an ad hoc model based on prior experiences which resemble the present. Such a model allows for neural predictions to be made anticipating upcoming internal and external sensory events, and the best course of action to manage the upcoming events (Barrett & Satpute, 2019). The brain uses emotion conceptual categories to ready the body for situation-specific actions, creating context-appropriate perceptions and experiences (Hoemann et al., 2019). These models are continuously updated using incoming error signals from sensory information and prior experience to create a reflexive framework that categorises and explains experiences (Barrett & Satpute, 2019). It is important to note that, according to this view, the brain does not react to incoming events. Instead, it anticipates these events from the constructed predictive model (Fridman et al., 2019).

The predictive processing framework allows for the creation of meaning relating to the specific event. As a consequence, emotions – upheld by the bipolar axes of valence and arousal, relating to the degree of physiological excitation (see section 1.2.2.3) – are argued to be a basic property of consciousness. Each exemplar of an emotion event is then stored and used in future predictive models to best support action and interpretation of the world.

It is important to note that the brain produces each emotional experience as an emergent sum of its cognitive, affective and physiological parts. As such, each experience is unable to be reduced to the components and cannot be experienced as anything but a whole-body phenomenon.

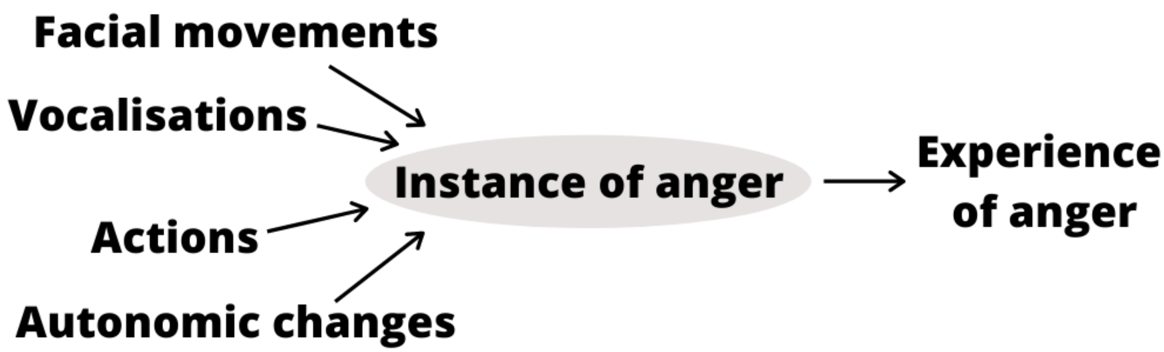


Figure 1.3. The measurement model for TCE. This is a measurement model, not a causal model, of emotion. That is, this figure does not depict the mechanisms which cause emotion, rather it demonstrates how measurement procedures might configure to evaluate an emotion event. Figure redrawn from Barrett & Westlin (2021, p.9).

The predictive models which underlie emotional experiences rely on emotional conceptual categories to explain the associated psychological phenomena. Emotion conceptual categories are believed to be learnt throughout development via contextualised interpersonal interaction and cemented into a social reality via the use of linguistic labels (J. A. Russell & Barrett, 1999). These labels are used to group perceptually similar instances of a range of psychological and physiological events into an emotion. Consistent and socially agreed linguistic labels allow for the quick communication and understanding of otherwise unknowable internal qualia within societies and cultures sharing the same language. While the TCE is a theory coming into vogue in the past decade, the constructionist hypothesis is not a novel one (see 2.1 for further discussion). Francois de La Rochefoucauld, a 17th-century French philosopher, suggested that even the most seemingly innate emotions and urges are constrained by learned social and cultural norms (Watt-Smith, 2016). The indigenous Baining people of Papua New Guinea, for example, have a pervasive emotion called '*awumbuk*' (Fajans, 1983). *Awumbuk* has been described by members of the Baining tribe as an inherently emotional experience: a 'social hangover' (Christopher, 1999); *awumbuk* is an amalgamation of a feeling of sadness, loneliness, boredom, and relief which follows the departure of guests following a social gathering (Bąk, 2016)

While the term *awumbuk* does not exist in English, there is evidence that once provided with untranslatable emotion terms, concepts can be rapidly integrated into the conceptual system. Moreover, the linguistic references used to create subdivisions in complex continuous spaces, such as emotions, have been argued to vary across time and space (Ellsworth, 2014). In line with this assertion, there is limited evidence that the English emotion terms most popular since the inception of BET represent fixed, eternal entities. The use and prevalence of specific emotion words have varied since the onset of emotion science (Dixon, 2021). It follows that emotion conceptual categories can be taught and learnt through social direction; a hypothesis that is central to TCE.

To test this, 98 fluent English speakers were provided with 30 emotion words that do not exist in English – such as *nalkil* from Utkuhiksalik which refers to the love felt for those who are defenceless (e.g., babies) – to assess whether these untranslatable words could be used to form emotion concepts. Participants were asked to generate a scenario in which they had felt the given emotion, to rate the emotion on the bipolar scales of valence and arousal, and to localise where in the body the emotion would be most felt (Mandel et al., 2018). The results indicated that participants were able to anchor the terms with the salient situational details of the given experience and situate the novel emotion terms within the larger framework of valence and arousal (see 1.2.2.3), which the authors argued provided evidence that conceptual content was generated for each word. However, without measuring the use of these novel terms to explain affective phenomena, it is difficult to assess whether, once learnt, untranslatable emotion terms can be readily incorporated as a conceptual category in individuals outside of the original host culture.

The criticisms of the TCE should also be noted at this juncture. Affective Neuroscience (AN) – a discrete perspective of emotion which holds that emotions are best understood as one of seven primordial behavioural urges or behavioural-instinctual action patterns (i.e. RAGE, FEAR, PANIC, SEEKING, LUST, CARE, and PLAY[1]) and that the subjective feeling is best explained as an abstracted layer of appraisal – has historically made some criticisms on the TCE (e.g., Panksepp, 2007, 2008, see 2004 for review) and will be briefly discussed herein. *In precis*, AN suggests that activation of "specific, evolutionarily very ancient, subcortical brain regions" (Panksepp et al., 2019, p.38) induce either positive and rewarding (SEEKING, LUST, CARE, and PLAY) or negative and punishing (RAGE, FEAR, and PANIC) behaviours. These action patterns are known as primary processes and are subjectively experienced as feelings based on implicit appraisals regarding anticipated key survival needs (Markett et al., 2018). Each primary process is activated by a limited set of unconditional stimuli and outlast the precipitating circumstances. AN holds that many of these affects are present from birth and induce reliable behaviours (e.g., SEEKING system induces coordinated gazing between mother and infant, Tronick & Cohn, 1989) and is theorised to be a positive subjective experience.

AN suggests that the TCE may impede progress in understanding emotions due to the reliance on social-developmental learning to explain emotion phenomena(Panksepp, 2010). That is, the TCE suggests that emotion populations are learnt via linguistic interaction throughout development, but AN argues that this perspective is only persuasive as it allows for a convenient conceptual way to study emotions verbally, rather than unravelling the deeper mechanisms underpinning emotion experience and behaviour.

Furthermore, it is suggested by proponents of AN that the TCE is a modern interpretation of the James-Lange theory of emotion. The James-Lange theory suggested that emotions are induced once cognitive processes have made sense of physiological data (James, 1884; Lange, 1885). Panksepp (2010) argued that the TCE thus relegates emotions

---

[1] The capitalisation of these Affective Neuroscience basic emotions follows standard practice in the literature (e.g., Panksepp, 1998; (Panksepp et al., 2019)) as there remains no consistent or agreed upon nomenclature for these primal emotions (see Panksepp, 2011, for further details).

into a subset of cognition rather than a process or function in its own right. It is arguable that this appraisal of the TCE is, in itself, an oversimplification of the predictive processing, allostatic processes, homeostatic functioning, conceptual learning, and social elements – amongst others – which constitute an emotion experience. However, it is a reasonably compelling argument at face value and aligns with folk notions (i.e., cultural ideas based on naive introspection) of emotion.

It is notable, however, that proponents of AN have suggested that both this approach and the TCE could exist harmoniously (e.g., Panksepp, 2007; Markett et al., 2018). Indeed, these two theories may have much in common but appear disparate as they focus on different aspects of an emotion; with AN focusing heavily on neurological anatomy/connectivity and measurable behaviours and not on experiences of consciousness, and the TCE focusing heavily on conscious experience and not on neuroscientific or behavioural variables. Ultimately, as with BET (see 1.2.1), the core differences between Affective Neuroscience and the TCE lies at the extent to which a taxonomy approach to documenting and understanding emotion experience is seen as helpful. The succeeding sections will now outline how the TCE explains the five core emotion aspects (situational; temporal; valence; physiological; and behavioural) using theoretical and empirical evidence.

1.2.2.1 Situational Component of Emotions

The TCE stipulates that emotions are functional states which are differentially constructed based on the demands and relevance of the eliciting context (Barrett, 2017b). Each emotion is a *situated conceptualisation*, which requires a setting, agents, objects, behaviours, events, and internal states to be fully realised; each of these aspects being represented by relevant psychological concepts (Wilson-Mendenhall et al., 2011). The representation of any given emotion population occurs within a network of concepts and constructs for each situation. Depending on the relative weighting of domain-general processes, emotions are elicited by informed predictive models based on the current and previously experienced similar situations (Oosterwijk & Barrett, 2014). Returning to the example of a PhD candidate in their viva, the individual's internal sensory signals (e.g. interoception; see 1.2.2.3) are integrated with knowledge representations (e.g. the importance of the event and concerns about imposter syndrome) to create a situationally constructed emotion of anxiety. Alternatively, the same sensations could be weighted differently and integrated with different knowledge representations (e.g. the importance of the event and knowledge that this may be the only opportunity to discuss their doctoral research in-depth), to create a situationally bound experience of excitement. Thus, it is stipulated that emotions cannot be understood separately from the context in which they are elicited and the situation's psychological relevance for the individual.

TCE proponents argue that it is the situated conceptualisations that generate *different* emotions (e.g., anxiety/stress vs. excitement during the PhD viva) and instances of the *same* emotion (e.g., excitement during the viva vs. excitement after securing a lectureship; Oosterwijk & Barrett, 2014). For emotion populations, this ensures that patterns of subjective, behavioural, and physiological responding will co-vary by eliciting situations. Barrett (2017a) argues that this variation allows for subjectively distinct experiences to be perceptually grouped by goal orientation or situational demand under the same linguistic marker. For instance, the excitement associated with the PhD viva and excitement of securing an academic job are likely to be experientially distinct emotions and may even be accompanied by varying physiological, neural, cognitive, and behavioural features, but still grouped by the label of 'excitement' based on the underlying intrapersonal situation of meeting one's academic goals.

Grouping emotions based on their situated conceptualisation is posited to occur through learning processes. Once an experience or context affords an emotion, the relevant underlying features are grouped perceptually and added to the constellation of emotion events available in one's repertoire. In abstract perceptual space, similar instances are grouped proximally closer to one another, while dissimilar instances are plotted distally. Across development, statistical regularities are theorised to emerge within and between emotions as a result of this learning (Hoemann et al., 2019, 2020). These regularities may relate to features or, notably, the situated nature of the emotion, and lead to the learning of situated emotion concepts. Thus, according to the TCE, emotions cannot be removed from the eliciting situation.

1.2.2.2 Temporal Component of Emotions

According to the TCE, emotions arise from prediction errors and emerge from the processing of changes in emotion trajectories across time (Cunningham et al., 2015). Thus, emotions are not distinguishable, uniquely formed psychological entities. Rather, they are continually modified, dynamic constructed processes which are always available irrespective of whether the individual attends to the valenced stimulus or not (Barrett, 2018; see 1.2.2.3). *In precis*, this means that an emotion is an ebbing and flowing brain-mind state; the experience of which is limited to the threshold of conscious awareness. This threshold can give an emotion the experience of an 'instance' with a concrete beginning or end, but the emotion event itself is actually continuous and dynamic.

As emotions are governed by the eliciting contextual demands and brain-based predictions, the decay of an emotion will vary across each instance. As such, the temporal component of any given emotion is not easily defined or measurable according to the TCE (Barrett, 2017b). However, there remains little empirical research on the temporal component of emotion and it is difficult to expand on this aspect of emotion experience.

1.2.2.3 Valenced Component of Emotions

According to the TCE, emotions are experienced subjectively, in part, through interoception and described as core affect (Barrett, 2017b). These two phenomena will be discussed in turn.

The term *interoception* has been defined as the holistic mechanism through which the central and autonomic nervous system senses, interprets, and integrates internal bodily signals and external sensory information (e.g. light, vibration) providing a constantly updating map of the body across all levels of cognition (Quigley et al., 2021). These interoceptive sensations are constructed into core affect, the feeling state constructed from the brain's "best guess" (Barrett, 2018, p. 37) about the state and resource budget (allostasis, see 1.2.2.4) of the body based on the ongoing internal signals. That is, the brain uses actual incoming interoceptive signals, simulated interoceptive sensations, and hypotheses about the causes of those sensations from past experience and perceives these multiple data streams as core affect.

Core affect is represented by the simple features of valence (positive, negative) and arousal (high intensity, low intensity). According to contemporary hypotheses (Hesp et al., 2021), valence is likely an abstracted layer of predictive meaning derived from the eliciting context concerning whether the individual has the available resources to adaptively respond to the situation. It is suggested that the balance between neurophysiological and biological costs and available resources is translated into conscious awareness as valence. However, this description is likely an oversimplification of an incredibly complex process that has only been considered theoretically and has not yet been demonstrated empirically.

Accordingly, an individual's core affective state is psychologically described and represented by a single coordinate on the intersecting axes of valence and arousal (see Figure 1.4). This structure is known as the affective circumplex (J. A. Russell, 1980). The affective circumplex allows for the representation of internal states through the geometry of a circle (Guttman, 1954). The x-axis represents valence, ranging from pleasant to unpleasant. The y-axis denotes arousal, ranging from high activity and attention to low activity and sleepiness (Barrett & Bliss-Moreau, 2009). Both axes are bipolar and occur independently of one another, meaning that arousal does not necessarily equate to the valence of a given emotion.

Proximity of emotion population coordinate points on the circle depicts the similarity between affective objects. As the distance between coordinate points increases, the degree of similarity decreases (i.e. the correlation becomes smaller), and the affective objects are experienced as qualitatively different. According to Barrett and Bliss-Moreau (2009), once affective objects are separated by a distance of 90° on the circumplex, the experiences of each object are distinct. A distance of 180° represents bipolar opposites.

Past 180°, the objects become increasingly similar again until the original coordinate is reached.

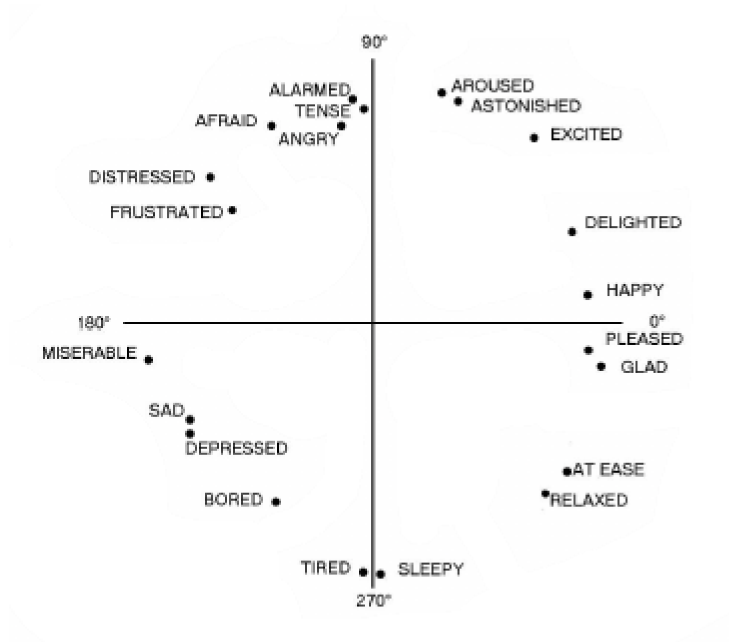


Figure 1.4. The affective circumplex with 21 affect labels plotted by valence (y-axis; pleasure-displeasure) and arousal (x-axis; high-low). (Image redrawn from Russell, 1980, p.1167.)

There is evidence from natural language processing techniques that supports the circumplex model's conceptualisation of subjective emotional experiences. Natural language processing analyses semantic patterns in language and can be used to review structures cross-linguistically. By combining large linguistic datasets, the underlying structures of emotion semantics – whether universal or diverse – can be evaluated (Jackson et al., 2022). In line with this hypothesis, emotion terms from 2474 languages were assessed for semantic similarity through network analysis (Jackson et al., 2022). The results indicated that, despite high levels of variation across language families, all languages differentiated emotions primarily by valence and arousal. That is, networks of positively and negatively valenced affective states were rarely associated with one another. Similarly, emotion terms that are associated with evoking high levels of physiological arousal were rarely associated with terms associated with low physiological arousal elicitation. Furthermore, the results found that languages closer in geographic proximity were more likely to share semantically similar emotion terms. The findings provide support for TCE, in so far that there is evidence for culturally specific emotion terms that could only be learnt through socially meaningful interactions as indicated by the influence of geographical proximity, and that emotion semantics are parsed on the bipolar axes of arousal and valence (Jackson et al., 2019), rather than providing evidence for discrete clusters of affect.

The assumption that the vast spectrum of emotional feeling can be boiled down to the bipolar dimension of valence[2] has been well criticised as overly simplistic (Panksepp, 2007). The brain has multiple reward systems, such as dopamine-based and opioid-based reward systems. Dopamine is a hormone strongly associated with pleasure, reward, and feelings of euphoria. Whereas opioids release endorphins, neurotransmitters which give us a happy or blissful feeling. Similarly, differential feelings of distress, fear, or other negative emotions arise from distinct brain regions and are associated with specific actions, such as seeking social support when scared or eating food when hungry. These actions are explained as epiphenomena rather than natural expressions of an innately biological process associated with evolutionary outcomes. It has been argued that the bipolar dimensions of valence and arousal cannot explain why the brain has multiple systems and regions which motivate different behaviours and qualitatively different psychological experiences. Instead, Panksepp (2007) argues that the TCE's minimal approach to understanding internal experience may be due to science's historical inability to analyse neurological and physiological signatures with any specificity and humanity's preference in distilling complex ideas down to the simplest form (i.e. Occam's Razor, the position that explanations that require the fewest variables to explain a phenomena is likely to be correct), irrespective of whether such simplicity accurately explains reality.

[2] Panksepp (2010) does argue that the bipolar dimension of arousal is similarly overly simplistic, however the argument conflates emotion intensity and arousal. These are separate processes (which are often mistaken for one another) and so will not be discussed herein given the conflation.

1.2.2.4 Physiological Component of Emotions

According to the TCE, physiological data help constitute and generate an emotion. The physiological component cannot be divorced from the subjective experiential aspect of the emotion. To constitute an emotion, it is argued that the brain constructs predictive models to promote adaptive responding to external stimuli (Barrett, 2017b). This prediction requires the body to assess the available resources (e.g., energy resources) and regulate metabolic expenditure in line with the actual needs and anticipated needs of the situation to maintain energy balance (Barrett et al., 2016; MacCormack & Muscatell, 2019). The efficient maintenance of energy regulation is known as allostasis (Sterling, 2012). As an example, allostasis describes the brain's capacity to increase cardiac output, redistribute blood flow to peripheral organs, and increase oxygen intake, in response to situations associated with threat. Allostatic efficiency requires the predictive models to anticipate the body's needs and to meet these needs appropriately. Too much or not enough of any given resource is inefficient and can lead to maladaptive emotional responding and autonomic nervous system (ANS) activity. The ratio of resource cost and availability is then assumed to be experienced consciously as valence (see 1.2.2.3).

1.2.2.5 Behavioural Component of Emotions

The TCE understands the behavioural component of emotion to also be contextually driven and motivated by predictive models of adaptive solutions, rather than incited by the emotion itself.

The TCE (Barrett, 2017b) holds that behaviours are motivated by the contextual demands and individual goals of the individual. When considering the evidence for facial expression production (see 1.2.1.5), in real-world social environments, static posed facial expressions are rarely produced. Instead, faces are dynamic objects which display many different expressions. The fact that prototypical basic emotion expressions occur relatively infrequently during interpersonal interactions (Gaspar et al., 2014) may suggest that facial muscle movements serve a range of purposes in addition to any role they might play in emotion expression. Research suggests that patterns of muscle activity vary across eliciting contexts, such that diverse patterns of facial movements convey specific information relevant to the current social interaction (Aviezer et al., 2008; Crivelli & Fridlund, 2019) . Within video footage of computer-mediated iterated prisoner's dilemma – a social dilemma paradigm in cooperation yields the largest mutual reward, but successful defection yields a greater individual reward, thus creating a dilemma of trust (Press & Dyson, 2012) – there is no evidence for patterns of AU activation which resemble prototypical facial expressions in response to positive or negative gameplay events (Hoegen et al., 2019; Stratou et al., 2015, 2017). Rather patterns of AU activation are differentiated by the preceding social contexts and cues. For example, AU activation of inner brow raiser (AU 1) and outer brow raiser (AU 2) – a configuration termed 'Eyebrow Up' (Stratou et al., 2017) – was associated with the participant cooperating and the opponent defecting. There was limited evidence of patterns of AU activation that corresponded to emotional facial expressions, except for smiling in response to mutual cooperation; an event assumed to be positive in hedonic tone (valence). Thus, rather than patterns of AU activation corresponding to emotion states, the authors concluded that gameplay events (i.e. context) were predictors of AU activation and facial expressions.

The above supposition of the TCE can be integrated and further supported by behavioural ecology theory (Fridlund, 1992). Behavioural ecology theoretical accounts hold that diverse patterns of facial movements convey specific information relevant to the social context (Crivelli & Fridlund, 2019). As there is little evidence of the theoretically proposed prototypical facial expressions in research (Elfenbein et al., 2007; Gendron et al., 2020) and in natural interactions (Stratou et al., 2015, 2017), it is suggested that action unit activations contain complex social information. The available information is context-specific and may be clustered based on context or valence rather than any potentially associated or theoretically prescribed emotion. This evidence supports the theoretical suppositions made by the TCE.

1.2.2.6 Evaluation of the TCE using the TAPAS methodology

As the TCE assumes variation is the norm and most aspects of an emotion are generated from predictive models based on situationally bound data streams, there is limited consistent evidence for the processes which allow emotions to be robustly predicted, measured, and reported in a reproducible manner. It must be noted that this lack of coherence in published results does support the TCE, as it is assumed that variations in emotion components are related to individual-level variables such as goal orientation and emotion concepts (Baltazar et al., 2019). It can, however, make it difficult to form testable and directional empirical propositions with any specificity. Indeed, any predictions must acknowledge the complexity of emotion measurement and take account of variables such as goal orientation. As theories are considered to consist of a set of hypotheses or assumptions which are falsified through critical empirical tests (Popper, 2014), it may be suggested that the TCE may not be defensible as a theory.

Such a criticism is not only potentially detrimental to research operationalisation, but also to conducting replicable work; by allowing divergent conclusions from – or researcher degrees of freedom for flexible interpretation of – results to support a specific theory, false-positive rates can increase in empirical publications (Simmons et al., n.d.). However, proponents of the TCE may argue that it constitutes an overarching conceptual framework from which new questions or investigations can be generated. While ultimately all models are wrong (Box, 1976), perhaps the TCE is the most useful model available. Despite this possible detrimental facet to the theoretical base, there are many theories, the TCE (Barrett, 2017b) included, which have the potential to yield untestable hypotheses (Rothermund & Koole, 2020) and I will use the TAPAS model (van Lange, 2013) to assess the TCE's usability as a theoretical framework.

Truth.

Theoretical frameworks should pursue an accurate reflection of reality (van Lange, 2013). The TCE (Barrett, 2017b) aims to explain the variety of affective experiences which occur as a subjective reality to humans, with the phenomena explained through social learning of conceptual categories and predictive processing (Barrett & Satpute, 2019). Proponents of this view often rely on meta-analyses – which estimate the mean and variance of population effects from a collection of studies (Borenstein et al., 2009) – to identify patterns in measurable variables, such as neurological activation (Lindquist et al., 2016), as a response to emotional events. Barrett (Barrett & Adolphs, 2021) has argued that the TCE uses data, such as the data from the meta-analyses (e.g., Siegel et al., 2018), to inform theoretical deductions and future empirical studies, rather than trying to fit the data to the theory. Furthermore, despite the arguments from Affective Neuroscience (AN), there is limited evidence to support the argument that subjective experiential emotion is induced, or any clear connective map as to how subjective experiential emotion may be elicited, by subcortical stimulation in human brains (see Panksepp, 2010 for overview) in a way that refutes the TCE. Most AN research relies heavily on research conducted on animals and is therefore not appraised in the present thesis to be as convincing as the meta-analyses undertaking in human participants. Using facial stimulation studies as an analogy, when facial muscles are activated through electrical currents to produce a smile, this does not necessarily mean that the individual is feeling positive or rewarding; behavioural output in animals following subcortical stimulation could be viewed as working in a similar vein and not representative of an emotion event and this work cannot be assumed to reflect processes in humans. However, the TCE can be used to explain emotion events explored as part of meta-analytic investigations in humans. As such, it would appear that the primary objective of the TCE is to document the evidence and explain phenomena as part of a replicable theoretical framework.

Abstraction.

Abstraction refers to a theory's ability to describe, using supporting evidence, qualia in a way that is widely accessible while complementing and extending existing theory (van Lange, 2013). I will argue below that the TCE fulfils the latter point, but that the TCE may struggle with expressing the minutiae of the theory in an accessible manner.

The TCE relies on several complex concepts to fully expand and understand emotion qualia. This includes neuroscientific theories of resource regulation, abstract and undefinable constructs, and cognitive modelling to explain how any given emotion occurs. While these concepts appear to be well substantiated by philosophical and experimental enquiry, attempts to explain the theory to lay audiences can often appear over-simplistic or overly dense. As such, I argue that the TCE cannot fully meet the requirements of abstraction.

However, the TCE (Barrett, 2017b) meets the second requirement of abstraction as it complements and extends other theories relating to social psychology and neuroscience. As discussed previously, during naturalistic dyadic interactions (e.g. Stratou et al., 2017), there is evidence that patterns of facial musculature change reflect the given context and goal orientation of the expresser, rather than reflecting prototypical emotional facial expressions. These results appear to support the TCE and also Behavioural Ecology Theory (Crivelli & Fridlund, 2019). As such it is possible to integrate the TCE into theories of pro-sociality.

Similarly, the TCE complements current neuroscientific understandings of the brain and resource management, specifically relating to allostasis and predictive processing. Both phenomena posit that the brain's primary purpose is to coordinate physiological resources required to adaptively respond and thrive to the given environment (Sterling, 2012). The TCE extends these models of self-regulation by incorporating and explaining the affective dimension of allostatic regulation. The affective dimension explains how the sensory consequences of allostatic and homeostatic functions are experienced and how they provide data from which these functions can be understood at a conscious level. For example, where inputs from the ANS and endocrine system may carry relatively low-resolution information, these inputs may be experienced an abstracted layer of subjective valenced feeling. The coordinates of the feeling on the affective circumplex will be related to previously experienced, proximal nodes and will be categorised using a linguistic marker based on proximity and similarity to neighbouring emotion populations (e.g., using a Generalized Context Model).

Thus, in line with the given exemplars, I argue here that the TCE partially fulfils the requirement of abstraction.

Progress.

According to the TAPAS Model (van Lange, 2013), theories should be refined to reflect the available evidence and should lead to the reduction in knowledge gaps for any given phenomenon.

The TCE (Barrett, 2017b) has provided the opportunity to explore emotions beyond the scope of the basic six outlined in BET (Ekman, 1992). While research had previously focused primarily on documenting evidence for the existence of these few emotion states – with varying levels of agreement or accuracy (see 1.2.1) – the introduction of a new lens through which emotion can be understood has yielded novel and exciting lines of enquiry which would otherwise likely not have occurred. For example, without a theory that stipulated the importance of context over emotion state in facial musculature change, Stratou and colleagues' (2017) research analysing naturalistic dyadic expressions using exploratory structural equation modelling may have instead used confirmatory models to evidence the existence of prototypical facial expressions. Thus, the TCE (Barrett, 2017b) is a theory that allows for further insights to be made about emotion and which serves to propagate future dynamic research, thereby meeting the standards of progress outlined in the TAPAS model.

Applicability.

Finally, applicability refers to a theory's ability to explain everyday phenomena across time and place (van Lange, 2013). The TCE (Barrett, 2017b) is a theory sensitive to the effect of variability in the human experience. As such, exemplar issues of sample generalisability and the effect of using samples from Western, educated, industrial, rich and democratic (WEIRD) nations are incorporated into the theoretical framework. In doing so, TCE considers how individual-level variables, such as health and socioeconomic disparities, can deeply shape emotions and wellbeing in ways that BET (Ekman, 1992) historically ignores. The TCE is also able to explain how and why important but common place behaviours occur, such as social decision making (e.g. Stratou et al., 2017). Thus I believe that the TCE meets the standards for applicability according to the TAPAS model.

Conclusion.

It may be posited that TCE meets the requirements of the TAPAS Model, with the exception for abstraction which is partially met. The TCE aims to explain the variety of emotion events that occur as a subjective reality to humans (truth), with the phenomena explained through social learning of conceptual categories, predictive processing and allostatic regulation (abstraction; Barrett & Satpute, 2019). TCE has allowed for more nuanced understandings of emotion phenomena, leading to new questions and methodologies to be developed. For instance, TCE outlines that emotion events are derived from errors within predictive processing whereas BET holds that emotion events occur as a response to an event (Wilkinson et al., 2019). Prediction error occurs when the model of reality created in the brain does not match incoming interoceptive and exteroceptive signals. According to the TCE, the brain integrates past experience to generate concepts to guide actions and give meanings to sensations (Barrett, 2017b). This understanding of how the brain constructs emotion events has, arguably, spurred a multitude of explorations into the importance of context and affordances in emotional experiences. Without the TCE's understandings, affective scientists may still be attempting to document evidence for the six Basic Emotions, despite there being little evidence to support their existence.

1.2.3 Theoretical Framework of the Present Thesis

Based on the discussion provided by the TAPAS Model (van Lange, 2013), the present thesis will use the TCE as the theoretical framework for conceptualising emotions. The limitations, namely the preclusion of testable and directional hypotheses, are discussed in light of the present work in Chapter Two. However, in short, the present research did not make assumptions related to which emotion(s) would be elicited by the experimental paradigm, and directional hypotheses were only made when informed by complementing theoretical frameworks, such as the Process Model of ER (Gross, 2015; discussed below). Thus, emotions are understood in the present thesis as highly variable, situated instances which are perceptually grouped via social learning and constructed from interoception, external data, and predictive models.

The choice of theoretical framework has implications for the research contained herein. According to the TCE (Barrett, 2017b), language and the associated behaviours are a fundamental aspect of emotion and ER (Lindquist et al., 2015). Indeed, the use of speech has been documented to occur in response to 80-95% of emotional events (Rimé, Mesquita, Philippot, & Boca, 1991), with this effect remaining constant across cultures (Singh-Manoux & Finkenauer, 2001) and emotion populations (Rimé, Finkenauer, Luminet, Zech, & Philippot, 1998). Speech is therefore likely to occur with high levels of frequency in daily life, thus marking it as a strategy worth empirical exploration.

Having identified how emotions will be understood in the present work, it is important to now delineate a theoretical framework for how emotions can be regulated.

1.3 Emotion Regulation

Emotions and ER are so closely interlinked that, dependent on the theoretical base of the researcher, the constructs can be appraised as being singular or distinct (Gross & Feldman Barrett, 2011). According to the TCE (Barrett, 2017b), it is difficult to distinguish regulatory processes from emotion generation. This is because emotions are elicited through a cyclical pattern of predictive processing (see 1.2.2.2). ER is, however, ultimately assumed to be a separate phenomenon by the TCE, as regulation allows for the modification of emotional response systems (behavioural; physiological; experiential) by psychological, chemical, or physical interventions (Gross & Barrett, 2011). Such interventions are theorised to directly influence the subsequent appraisal and predictive processes involved with emotion elicitation. According to Aldao (2013), the goal of ER is not to eliminate maladaptive emotions and replace them with adaptive emotions, but rather to influence the dynamics of each emotion to produce an adaptive response to the given context.

ER encompasses both up- and down-regulation of negative and positive affective states; regulation can occur either explicitly as a conscious, deliberate action, or implicitly, outside of the agent's conscious awareness (Braunstein et al., 2017). Regulation of emotion is theorised to involve dynamic and reciprocal interactions between potential strategies; strategies that allow the agent to adjust their goals and behaviours in line with environmental and social cues (Sheppes, 2014). Emotions are deemed to be adaptively regulated when implemented strategies flexibly meet the demands of environmental and contextual constraints that modify, manage, or organise the agent's emotional state whilst also meeting regulatory goals (D'Agostino et al., 2017a). In contrast, emotion dysregulation implies rigidity in, or incongruous, regulatory strategy implementation; implementation which results in an inability to moderate or manage emotions in line with regulatory goals (Campos et al., 2011). ER implementation can serve to meet long-standing goals, such as a reduction in self-injurious episodes to improve mental wellbeing. Similarly, ER may occur to maximise short-term gains to the detriment of long-term goals, such as using illicit substances to promote positive social interactions; a process known as hedonistic ER (R. J. Larsen, 2000). Thus, ER can be flexibly employed to meet a wide variety of intrapersonal needs. It is worth noting that in the empirical literature the concept of regulatory goals is nebulous and ill-defined. Regulatory goals are often described as existing outside of the individual's conscious awareness (Gross, 2014); a proposition that allows ER research to minimise inconclusive findings by asserting that interventions must somehow be incongruent with implicit but unknown goals. Thus, it is imperative when operationalising ER research that the process, and the associated functions, are deconstructed tangibly.

Irrespective of the underlying goals, in daily life people are constantly exposed to stimuli that may elicit an emotion, such as being stuck in traffic or remembering pleasant experiences. It is assumed within the literature that the elicitation of a *full-blown* emotional response is unlikely to occur at an everyday level (LeBlanc, 2013). I believe that this suggests that a high degree of ER occurs in an individual's day-to-day experiences as, without application of regulatory strategies, emotions would be uncontrollable and intense psychological events. In line with this deduction, undergraduate students based in the United States of America have reported that they consciously regulate their emotions on average 6.6 times a week, that is, almost once a day (Gross et al., 2006). As ER can occur as both an explicit and implicit process (Braunstein et al., 2017), the rates of ER occurrence in daily life are likely much higher than reported in Gross and colleagues' (2006) research. It has been suggested that ER could be so integral to human functioning that almost every action is a form of ER (Aldao et al., 2010). Despite the high rates of ER evident in the everyday lives of non-clinical populations, this area of ER remains an under-explored research area. Most understandings are extrapolated from our knowledge of emotion dysregulation in clinical groups, such as in individuals with schizophrenia (e.g., Moran et al., 2018), or are based on forced specific paradigms within a laboratory setting which are not fully evidenced as actually reflecting ER processes in daily life. To overcome this limitation in the literature, the present thesis will investigate how speech-based ER occurs via speech in the daily lives of non-clinical populations through an exploratory qualitative study and will integrate the results into ER theoretical frameworks and the empirical design of later quantitative studies.

Several ER frameworks aim to delineate and organise the regulatory process. For example, according to Gratz and Roemer (2004) ER is a cognitive framework whereby: (1) the individual is aware of and understands the emotion; (2) the individual accepts the emotion; (3) the individual controls impulse behaviours and behaves in accordance with regulatory goals; and (4) uses flexible strategies to modulate emotions at will. Deficits to any one of these processes are considered to be indicative of ER difficulties (Gratz & Roemer, 2004; Gratz & Tull, 2010). The TCE does, however, suggest that the Process Model of Emotion Regulation (PMER; Gross, 1998, 2014, 2015) is the most appropriate model with which to base constructionist emotion research (Gross & Barrett, 2011). In part, this is because the PMER can be integrated and updated within the model of the predictive brain and active inference framework. Further, both the PMER and the TCE consider each aspect of an emotion when modelling how the event is elicited and regulated. Both theories also prize individual traits, such as learnt concepts, and state variables, such as resource availability, when explaining and understanding emotion phenomena. As such, the present thesis will discuss Gross' (1998, 2014, 2015) PMER.

1.3.1 The Process Model of Emotion Regulation

According to the PMER (Gross, 1998, 2014, 2015), emotions can be altered when a discrepancy occurs and is identified between an agent's goal/desired emotional state and the actual or projected emotional state. According to the TCE, emotions are assumed to exist in a cyclical feedback loop of appraisal and generation (see section 1.2.2.2; Barrett, 2017b), with ER being able to occur at five-time points in the emotion generative sequence. Each of the five-time points at which regulation can occur signifies and dictates which groups of regulatory processes may be employed from that specific stage of the emotion generative process. The five ER time points are as follows: (1) situation selection; (2) situation modification; (3) attentional deployment; (4) cognitive change; and (5) response modulation (see Figure 1.5 and Table 1.1). Table 1.1 outlines the five groups of ER strategies and gives non-exhaustive example strategies for each of the time points. It is important to note that the mechanisms through which emotions are regulated are unlikely to be efficacious across instances of differing emotions (Barrett, 2017a), or in different emotion eliciting contexts (Ford & Gross, 2019). When 127 individuals were asked to rate the efficacy of well-researched ER strategies, such as expressive suppression, across a myriad of social contexts, it was the interplay between context and the specific emotion – not the strategy itself – which dictated the perceived adaptiveness of the strategy in regulating emotion (Mansell et al., 2022).

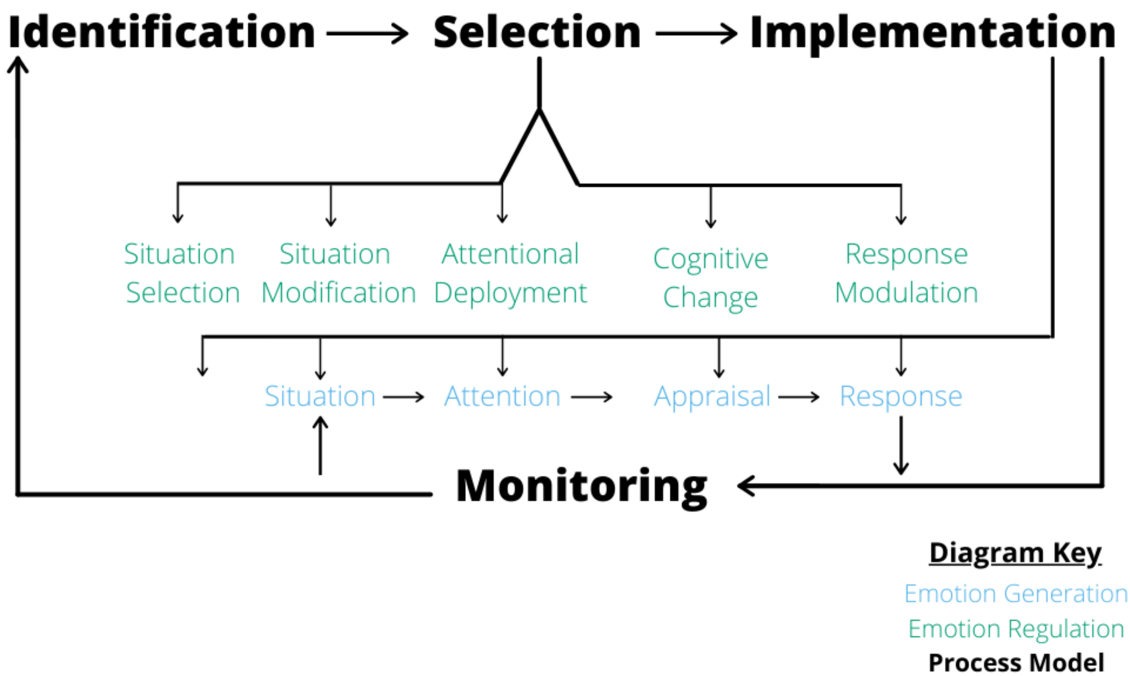


Figure 1.5. The PMER, outlines the embedded nature of regulatory processes in the sequential model of emotion generation and the five groups of regulation strategies that occur at these time points. Feedback arrows indicate that all three stages are constantly iterating cycles. Figure redrawn from McRae and Gross (2020, p.2).

Table 1.1.

The Five Groups of ER Strategies, Exemplar Strategies and Tactics Organised by The Stage in The Emotion Generation Cycle in Which the Strategies Can First Be Implemented. Table modified from Gross (2015).

Strategy Group	Selected Strategy	Example Tactics

Situation Selection	Avoidance	Declining to engage with the emotional situation in any meaningful manner
Situation Modification	Direct Request	Taking action to impact a situation in a manner that aligns with regulatory goals
Attentional Deployment	Rumination	Recurrently directing cognitive resources, namely attention, towards causes and consequences of an emotion
Cognitive Change	Cognitive Reappraisal	Reinterpreting or re-evaluating the situation to align with regulatory goals
Response Modulation	Expressive Suppression	Preventing the outward expression of the internal emotional state

The five-time points of regulation can be distinguished further into ‘antecedent focused’ and ‘response focused’ strategies (Gross, 2015). Antecedent focused strategies refer to regulation that occurs early in the emotion generative process, before the emotion is fully constructed, by moderating the impact of eliciting cues and contexts. For example, an undesirable emotion may not be elicited by a specific stimulus at all if an individual chooses not to engage or attend the event in which the stimulus resides (situation selection). Antecedent strategies include situation selection; situation modification; attentional deployment; and cognitive reappraisal. Response focused strategies refer to regulation that happens late in the emotion generative process, by altering one or more of the components associated with emotions; regulation can occur on the behavioural, physiological, and/or subjective experiential level. It is important to note that according to the PMER, ER strategies from different time points can be used in parallel to best meet the needs of the individual (Gross, 2014).

The PMER (Gross, 1998) offers a simple framework from which empirical research can be designed. The model may be critiqued, however, based specifically on the ER research conducted to date. There has been an overreliance in the literature investigating the cognitive aspects of ER and as such the field is almost wholly dependent on behaviours explicitly directed by a researcher in a laboratory (Levenson, 2019). The present work will overcome this limitation by using a bottom-up approach to strategy identification. This will be achieved through a qualitative study that will explore how emotions are experienced and regulated using speech in everyday life. Two strategies identified in this study will then be empirically tested in laboratory conditions.

The lack of ecological validity of emotion research has been further compounded by the fact that funding and research opportunities are largely constrained by extant work, meaning that the direction of new research is determined by prior findings. While the same case could be made for a large proportion of experimental psychological research, this criticism may mean that the degree to which these empirical paradigms reflect and explain reality is low. Researchers have, however, taken this criticism as a means of furthering scientific discovery. Future researchers have been called to arms to embrace research projects exploring any imaginable aspect of emotion and its related processes through the careful construction of measurement protocols and the inclusion of interpersonal processes (Levenson, 2019; McRae & Gross, 2020). By using a well-validated and transparent framework from which ER can be operationalised and measured, any subsequent research is likely to be rigorous and allow for meaningful progress to be made. As such, when taking into account the opportunity to undertake robust science and the clear convergence of an easily understood model with wider literature, it is clear why within contemporary literature the PMER is the most widely used model in affective science (Koole, 2009).

1.3.2 Emotion Regulation in Everyday Life

Up to this point, ER has been discussed from a broad theoretical perspective. The next section will narrow the focus to discuss and evaluate ER in everyday life. While an important facet of human experience – the formation and use of personal, everyday methods of regulating affective states is believed to be a universal and integral aspect of the human experience (Gross, 2014) – this has been a largely under-researched area. To date, ER phenomena are primarily investigated in laboratory conditions where ecological validity or evidence of the use of the proposed strategies in daily life are low. The exception to this is investigations into clinical populations with known impairments to emotion responsivity and regulation, such as schizophrenia (i.e. Moran et al, 2018) or psychosis (Ludwig et al., 2020), where experience sampling of reports of recent ER and emotionality are modelled to predict adaptive emotional outcomes. However, research in clinical populations cannot necessarily be extrapolated to or assumed to explain the lived experiences of, non-clinical populations (Mould & Upton, 2012). Furthermore, some of the basic questions relating to whether and how individuals choose to regulate their emotions in daily life have largely been neglected within the literature. Hence, as the selection and use of ER strategies has a profound impact on both our well-being and social lives, it is crucial to model adaptive regulation – including the antecedents and subsequent qualia – as they occur in the lived experiences of non-clinical populations. Without a more comprehensive understanding of ER in the daily lives of non-clinical populations, I argue that it is unclear the extent to which theoretical assumptions, models of regulation, and empirical investigations reflect real-world phenomena and lead to a replicable and robust scientific field.

In a qualitative study exploring when and how individuals regulate their emotions in daily life (Gross et al., 2006), 91 American undergraduate students undertook semi-structured interviews for 15 minutes. A qualitative methodology is used as these methods seek to explore, understand, and explain the social world; creating a data set that reflects reality in deep detail, without being reductive (Ochieng, 2009). In the interviews, participants were prompted to reflect on their everyday experiences in the past two weeks and describe them in as much detail as possible. The core questions underlying the available prompt were: (a) which emotions are the target of ER; (b) which aspect or component of an emotion is regulated; and (c) what ER strategies are used in everyday life. The data were transcribed and analysed using thematic analysis. The participants' responses highlighted a total of 24 emotion types, both positively and negatively valenced in nature; with the most common described emotions being anger (23% of reported episodes), sadness (22% of reported episodes), and anxiety (10% of reported episodes). Participants reported that, when regulating an emotion, both the expressive behaviour and subjective experiential aspect of emotion was moderated equally. Participants reported regulating both aspects at the same time, meaning that regulation does not occur as a zero-sum process and that strategies can be used flexibly and in parallel with other strategies. This is not surprising as, when compared with regulating physiological structures, behaviour and subjective experiences are the two tangible aspects of an emotion that an individual can have a meaningful sense of control of in daily life. The study found that all but one instance of ER involved the down-regulation of negative emotion. Such a finding is surprising as according to the ER theory, both positive and negative emotion can equally be up- or down-regulated (Gross, 2014). As participants were asked to only report one emotional episode (Gross et al., 2006) and because negative emotions tend to be remembered more vividly and are retrievable for longer periods (Kensinger, 2009), this finding may suggest that participants' most salient recent memories were more negative

It may be argued, however, that the underreporting of the regulation of positive affect may have occurred due to the methodologies used. Some researchers argue that unless the ongoing, immediate emotional experience is assessed the data will inherently be contaminated by human error (Colombo et al., 2020). In the above work (Gross et al., 2006), due to the heightened salience of negative events, coupled with the short interview period (≤15 minutes), higher rates of negative emotionality were likely reported and no space was given to reports of positive emotionality. In line with this assertion, when the use of positive ER strategies was explicitly incorporated into the research paradigm using experience sampling methodologies, the results reflected ER theory. Experience sampling allows for the data collection of phenomena close in time to the experience and in real-life contexts. In a study exploring the regulation of both positive and negative affect in daily life (Brans et al., 2013), participants were asked to report momentary events and the associated positive and negative emotions over seven days when randomly prompted using experience sampling up to ten times a day. Participants were asked to report their current feelings across six emotion states (e.g. happy, angry) Emotion scores for each event were yielded by averaging scores across items. Participants were also prompted to indicate the extent to which they used the ER strategies of reflection, reappraisal, rumination, social sharing, and expressive suppression since the previously reported emotional event. Changes in affect were calculated in the difference in mean score from one momentary report to the next. The results showed that following positive emotional events, positive emotions were up-regulated through reappraisal, reflection, and distraction ER strategies.

These results were further replicated in a study where 136 American university students were asked to report three high- and low-emotional experiences of their day for seven days (English et al., 2017). Participants were asked whether they had influenced or changed their emotion and, if so, in which direction. For each event where the individual indicated that ER had been undertaken or attempted, participants were asked to rate the extent to which they used distraction, reappraisal, and suppression. Only events associated with ER were included in the data analysis; 77% of negative emotional events and 58% of positive emotional events were reported to be regulated in the sample. Positive emotions were found to be up-regulated through the use of reappraisal and distraction. Moreover, emotional suppression strategies were found to dampen positive emotions; in these cases, suppression was used specifically by participants to change their mood towards neutrality or negativity. While this study focused solely on the high- and low-points of the day, and as such may miss the nuanced regulation of less extreme emotions, the results highlight the need for consideration of wider ranges of ER opportunities. Similarly, when taken together, these studies highlight the need for the field to realign with theory and include the regulation of positive affect alongside negative affect in experimental paradigms.

When the emotional episodes available in the semi-structured interview data (Gross et al., 2006) were situated in the PMER (Gross, 1998), ER occurred most frequently at the response modulation (53% of reported episodes), attentional deployment (39% of reported episodes), and cognitive change (33% of reported episodes) time-points. These percentages total more than 100% as individuals are likely to use multiple strategies when regulating a single episode of emotion (Aldao et al., 2010); a finding which is consistent with the assumptions of the PMER (Gross, 1998). As previously discussed, most ER research underpinned by the PMER (Gross, 1998) has focused on the cognitive aspects, namely strategies that fall within the realms of cognitive change and attentional deployment (Levenson, 2019). When considering the high rates of response modulation in these results (Gross et al., 2006), it is unclear why empirical research has not investigated the effects of strategies occurring at this stage, given that over half of reported emotional episodes indicate the use of these strategies in daily life. As such, there is a major gap in our understanding of ER.

As any behaviour or strategy could arguably influence an emotion's trajectory, thereby fulfilling the function of ER (Aldao et al., 2010), it is reasonable to posit that creating an all-inclusive catalogue of response modulation ER strategies is not possible. By only researching the standardised cognitive ER strategies, however, ER research likely has reduced ecological validity – that is the ability for the research to be generalised outside of a research context – which restricts the potential ability for psychological research to induce impactful change on the lived experiences of the wider population. To overcome this limitation, it may be pertinent to investigate which regulatory strategies are used in daily life, with what frequency they occur, and the affordances and antecedents which render them adaptive.

As argued above (see 1.2.3), according to the TCE (Barrett, 2017b), language is a central component underpinning emotion and ER (Lindquist et al., 2015). The centrality of language also extends to the specific use of speech. Speech occurs following 80-95% of emotional events (Rimé et al., 1991a), and is associated with being able to express, understand, and regulate emotion. As speech is fundamentally tied to ER, it is a strategy worth empirical exploration.

Despite this, there have been few research projects systematically investigating whether and how specific spoken language behaviours regulate emotions and what determines the implementation of such behaviours. The next section will consider some speech-based emotion regulatory behaviours from which I will identify limitations that currently restrict our understanding of speech-based ER, including (a) concerns of construct validity and inconsistencies in the operationalisation of speech-based ER across differing paradigms; (b) the lack of contextualised framework which considers moderating, intra- and interindividual variables that could explain the effect, or lack thereof, of regulation; and (c) the lack of clear mechanistic models regarding how spoken language regulates emotions.

1.3.3 Speech-Based Emotion Regulation

Historically within ER literature, the constructs of language as a whole and speech as a singular entity appear to be synonymous. Language in totality has been described as a medium that can conjure cognitive images, convey infinite combinations of symbols, construct reality, and create universes of thought (Chomsky, 2005). Speech, however, is how humans vocally communicate and convey language (Fitch, 2000). With regards to the expression and regulation of emotion, speech-based behaviours can not only allow for the simple read-out of the internal affective state of the speaker; speech can also provide a complex mechanism through which the internal affective state is explained and regulated (Wood et al., 2016). As the present thesis aims to first establish which regulatory strategies are actually used in everyday life, the experimental paradigms will be delineated following an inductive qualitative exploration. Thus, at this juncture, the present chapter cannot provide an overview of speech behaviours that will be investigated (see 5.1 and 7.1 for the literature reviews of the investigated behaviours). This section will provide some examples, and supporting research, of speech-based ER strategies, thus providing an insight into and critiques of the field to date.

1.3.3.1 Self-Talk

Self-talk refers to the process whereby an individual can transcend their egocentric viewpoint to be introspective and reflect on emotional processes through the articulation of an internal position where the sender of the message is also the intended receiver (Latinjak et al., 2014). Specifically, self-talk is defined as being a multifaceted and dynamic process that includes but is not always inclusive of (a) verbalisations addressed to the self as the third person (e.g., “Olly” instead of “I” or “you”); (b) is instructional and motivational for the individual (e.g., “Olly can definitely pass her viva!”); and (c) contains interpretive elements related to the content of the statements (e.g., “she can do it because she’s an expert in speech-based ER”; Hardy, 2006). Self-talk is often dichotomised into being either goal-directed or spontaneous. Goal-directed self-talk uses verbalisation to situate the emotional event in past experiences or learning and increases the emotional state to meet the regulatory goals (e.g., “Olly, you have prepared well for the PhD viva so you can do it”; (Latinjak et al., 2014). Conversely, spontaneous self-talk, that is uncontrolled and automatic self-talk (e.g., “I can’t do this”), has been typically associated with high levels of emotional arousal and/or valence (Latinjak et al., 2017), to the extent that it has been argued to fulfil functions only related to the expression of emotion (van Raalte et al., 2016). This understanding of self-talk may lead one to conclude that self-talk is neither an antecedent nor consequence of an emotional event, but is rather a fundamental component of an emotion (Fritsch & Jekauc, 2020). According to the TCE (Barrett, 2017b), however, emotions occur as a cyclical feedback loop of appraisal and generation. As such, from this theoretical position, self-talk must fulfil regulatory functions wherein: meaning can be made of distress; the created meaning is associated with prior experiences analogous to the one being experienced; and future behaviours and subsequent emotions are then directly informed by predictions made from the meaning created by self-talk.

It follows that if goal-directed and spontaneous self-talk fulfils regulatory functions then self-talk must provide measurable changes to an emotional event in line with the individual’s regulatory goals. This was tested in a study of the impact of self-talk on anxiety after a public speaking task (Kross et al., 2014). Eighty-nine North American undergraduate students were instructed that they would be videotaped undertaking a modified version of the Trier Social Stress Test (Kirschbaum et al., 1993). Participants believed they were being assessed for public speaking proficiency by a panel of trained interviewers. Participants were given five minutes to prepare, after which they were provided with instructions that asked them to use either first person or third person pronouns (self-talk) when verbally reflecting on their current emotional state. The level of state anxiety was measured at the start of the experiment before information about the task was given, and immediately after the public speaking task using a 7-point Likert scale anchored from 1 (‘very negative’) to 7 (‘very positive’). The results (Kross et al., 2014) indicated that participants who engaged in self-talk, operationalised as talking to the self in the third person, reported significantly lower levels of negative emotion compared to baseline and when compared to the other group who used first-person pronouns. It may be suggested therefore that self-talk, when operationalised using third-person pronouns, allows individuals to regulate their anxiety about an event in a manner that promotes post-event ER, likely through psychological distancing (e.g., Nook et al., 2017).

Similarly, Kross and colleagues (2014) suggested that by using self-talk the individual can gain perspective and distance from the stressor or emotion, which allows for adaptive regulation to occur. It may be argued, however, that as the study did not use a validated emotion measure that it is unclear how self-talk regulates state anxiety. Indeed, it is not clear how the measure used recorded intraindividual state and trait anxiety as participants rated their state emotion on a bipolar scale ranging from ‘very negative’ to ‘very positive’ – neither construct having any direct bearing on anxiety as an emotional experience. Emotion measurement protocols must be carefully chosen to meaningfully explicate emotion-related processes. The extent to which this study demonstrates the emotion regulatory capabilities of third-person based self-talk is unclear and, accordingly, the emotion measurements used may not be robust or sensitive in evaluating anxiety.

Furthermore, there are inconsistencies in the operationalisation of self-talk. Across the literature self-talk has been operationalised to be talking to the self in the third person (Kross et al., 2014), the first person (Latinjak et al., 2017), using any non-first-person-singular pronouns (Orvell et al., 2020), goal-directed commentary (Latinjak et al., 2014), or any form of verbalization in which there is no communication partner available (Oliver et al., 2008) (Oliver, Markland, Hardy, & Petherick, 2008). Thus, it is unclear the extent to which the construct of *self-talk* is a robust and well-defined phenomenon. Without clear parameters of what does and does not constitute the behaviour (Torre & Lieberman, 2018), self-talk may arguably be a construct composed of many lower order behaviours, such as rumination. Without consistency in operationalisation, from which conceptual and direct replications can occur to assess the replicability and parameters of the phenomenon, it is unclear how and why self-talk influences emotion.

1.3.3.2 Affect Labelling

A well-documented speech-based ER mechanism is affect labelling, which is the act of assigning an emotional experience with the appropriate subjectively associated noun phrase to down-regulate the emotion as a response focused ER mechanism (i.e. naming anger when it is felt; Torre & Lieberman, 2018). When 44 American University students were exposed to images from the International Affective Picture System (Bradley et al., 1999) rated as being either highly or moderately negative, or neutral, individuals who were presented with a forced-choice paradigm and asked to choose the affect label from two presented (i.e. disgust and joy) which best described their affective experience-reported lower levels of distress following exposure to negative images when compared to those who did not (Lieberman et al., 2011). When the same procedure was replicated and allowed 39 older adults to choose either a label from three words that best matched their emotional response or to simply observe the image, levels of distress were greatly reduced in individuals who could choose an affect label (Burklund et al., 2014). Affect labelling was thus suggested to be a form of ER. However, the process model of regulation has not yet been delineated, with possible mechanisms – such as distraction – speculated but not substantiated (Torre & Lieberman, 2018). It is perhaps understandable that there remains a lack of a clear mechanistic model for affect labelling as the first formulation for emotion differentiation and labelling was 20 years ago (Barrett et al., 2001) and that the state of the field is still in the descriptive stage of discovery. The descriptive stage of science allows researchers to focus on describing the general properties of the phenomena (Nook, 2021). However, when causal inferences are made based on descriptive work, as I would argue has been the case for affect labelling, we continue to amass data and publications which do not further our understandings of the phenomena or theory formulations, and allow for the proliferation of untested models in the literature or clinical practice. As we are unable to explain with any specificity a mechanistic model, a gap remains as to why affect labelling regulates emotions.

If we consider affect labelling within the theoretical context of the TCE (Barrett, 2017b), affect labelling may convert emotional stimuli, such as core affect, into a symbolic representation using language. It has been suggested that abstraction of the stimulus through language detaches the individual from the specifics or reduces the intensity of the emotion event in a manner which encourages psychological distancing (Nook et al., 2017). There is some evidence for this theoretical assumption during exposure therapy in clinical settings (Kircanski et al., 2012). Within this work, 88 participants with arachnophobia were randomly assigned into one of four ER intervention groups (affect labelling; reappraisal; distraction; or exposure alone), and were subsequently exposed to live Chilean rose-haired tarantulas whilst skin conductance and levels of behavioural approach to the stressor were recorded. Participants within the affect labelling intervention were asked to vocalise a self-constructed sentence including negative words describing the spider and their emotional experience (e.g. "I feel anxious the disgusting tarantula will jump on me"). In the reappraisal intervention, participants were asked to construct and vocalise a sentence including neutral words which frames the spider as a neutral entity to mediate negative cognitions (e.g. "Looking at the little spider is not dangerous for me"). Participants in the distraction group were asked to vocalise a sentence about an unrelated object (e.g. "There is a television in front of my couch in the den"). Participants in any of these intervention groups were asked to vary their sentence vocalisations across exposure trials. Participants in the control exposure-alone intervention group were not asked to vocalise.

Affect labelling was found to be more effective than any of the other interventions in reducing skin conductance response and in increasing the behavioural approach of arachnophobic participants to the tarantula in the 1-week follow-up. Moreover, 1-week after the experiment, participants who vocalised a higher percentage of fear and anxiety associated words had greater skin conductance response reduction and were more able to approach the spider than participants who vocalised a lower percentage of fear associated words in the affective labelling intervention group. Thus, it was concluded that affective labelling was more effective than other ER techniques – specifically reappraisal and distraction – in reducing psychophysiological arousal and improving behavioural responses to a fear-inducing stressor. The results indicated that explicit affect labelling produces more pronounced benefits than any other intervention up to 1-week later.

An alternative explanation to the above effects may be that affect labelling and ER facilitate the operation of independent mechanisms. Many studies have found that affect labelling does not regulate emotions following exposure to aversive stimuli (e.g., Nook et al., 2021), suggesting that hidden moderators may underpin the effect. Studies by Nook and colleagues (2021) found that free labelling one's emotion experience in response to aversive images made subsequent cognitive ER, such as reappraisal, less effective. Furthermore, affect labelling has been found to facilitate the selection of maladaptive regulatory strategies (Vine et al., 2019), has been suggested to deplete resources and motivation for subsequent regulation based on the assumption that affect labelling is an effortful task (Satpute et al., 2020), and is suggested to constrain available regulatory strategies based on the crystallised appraisal of the emotion event (Nook et al., 2021). As such, a mechanistic model of affect labelling must be refined to delineate the mechanism and moderating processes that facilitate associated ER.

1.4 Rationale, Aims, and Research Questions

As previously outlined, the field of ER has amassed a large amount of empirical work but has yet to answer some of the basic questions of whether, how and why speech-based ER occurs in daily life. This is problematic in two ways. It has created a body of knowledge that may not reflect actual perceptions and instances of ER, and it does not illuminate whether, how and why ER is efficacious. As argued in section 1.3.2, the literature has tended to focus myopically on a selection of cognitive regulation strategies and has yet to demonstrate that these strategies are the most prevalent in the daily lives of non-clinical populations. This is particularly notable in terms of response modulation – ER which occurs following emotion elicitation – which has been suggested to occur following 53% of everyday emotional events (Gross et al., 2006) but is the least studied form of ER to date. Therefore, the thesis aims to delineate whether, how, and why regulation occurs in daily life, focussing specifically on speech-based behaviours. By answering some of these basic questions, the project will derive a basic framework from which future experiments – both within this thesis and for researchers in the field of affective science – will be operationalised. Ultimately, this work will provide a comprehensive understanding of some of the basic questions of ER, thus reducing or removing the gap in the literature, and allow for mechanistic models to be constructed based on the results.

As discussed in section 1.3, the operationalisation of emotion must be carefully considered and informed by theoretical perspectives to ensure appropriate methods and measures are used. This is particularly pertinent when considering that the TCE posits that emotions occur as iterative and dynamic changes to neurophysiological and psychological structures (Barrett, 2017a), and any changes to emotion components or systems are assumed to be unique to each individual and eliciting context (Barrett, 2016).

According to the TCE, a multimodal approach that applies psychological and physical measures of emotion is the optimal model for emotion measurement as it allows for the categorisation of physical and psychological changes across timepoints, assuming independence of changes (see section 1.2.2.4 for discussion). Despite these considerations, most language associated ER research to date has relied solely on a singular method of measurement (e.g., Kircanski et al., 2012; Kross et al., 2014). The broader psychological and physical variables which are amalgamated into the conscious and holistic experience of an emotion were explored in study one. In the second and third study of the present thesis, the proposed gold standard of regulation measurement was used (Barrett, 2016): subjective self-report measures were collected using the TCE supported Positive and Negative Affect Schedule-Extended (Watson & Clark, 1994; L. F. Barrett, personal correspondence, September 13, 2017, Appendix U), and the psychophysiological measure of heart rate variability was taken.

The aims of this research are to (1) explore lay individuals' understandings of emotion and ER (Chapter Three); (2) examine which speech behaviours are used to regulate emotion (Chapter three); (3) investigate individuals' experiences of the parameters or affordances which are perceived as promoting or constraining strategy implementation and efficacy (Chapter Three); and (4) assess the regulatory efficacy of these strategies in line with the TCE (Barrett, 2017b) and the PMER (Gross, 2015; Chapters Five and Seven). It was hypothesised in the quantitative studies (Chapters five and Seven) that the behaviours identified in the qualitative study (Chapter Three) would down-regulate (i.e. reduce) negatively valenced state emotion, up-regulate (i.e. increase) positively valenced state emotion, and regulate physiological response systems (e.g. heart rate variability).

To meet the above aims I applied qualitative methods to identify speech-based ER strategies, as well as the associated cues and contexts, and quantitative methods to investigate the efficacy of specific strategies in promoting adaptive regulation through quantitative methods. A sequential exploratory mixed-methods analysis (MMA; see 2.5) was used to allow for the validation of findings between different research approaches and to increase the chances of producing comprehensive, internally consistent conclusions (R. B. Johnson et al., 2007). MMAs are theorised to promote the production of more complete understandings of everyday experiences by combining information from complementary kinds of data; for instance, descriptions of context which mediate speech-based ER through qualitative work, combined with measurements of specific ER strategy efficacy through systematic, lab-based experiments in a quantitative paradigm. The integration of qualitative and quantitative data within the current project will allow for the corroboration of data regarding ER efficacy, for example, the subjective, anecdotal accounts and psychobiological measures of physiology in response to stressors and ER (Creswell et al., 2003). Using an MMA is also assumed to facilitate deeper understanding through the provision of rich data which can consequently augment interpretation, implications, and applications of the study findings (Johnson et al., 2007). Despite the obvious strengths of MMAs, to date, there has been a dearth of studies using such methodologies in emotion research.

1.5 Structure of the Thesis

The present thesis uses a mixed-methods approach across four studies to assess the associated contextual cues and efficacy of speech-based ER and is divided into eight chapters. Chapter One has outlined the current theoretical and psychological understandings of emotion and ER, demarcating the epistemological position of the present research. I then considered the literature of how ER has been explored in day-to-day life, focussing on the use of speech-based ER due to its importance to the TCE. This provided an overview of emotion, ER, and speech-based ER from which some of the basic questions can be derived and exploratory research can be operationalised for this particular project.

In Chapter Two, the epistemological framework of psychological constructivism and the everyday will be further explored. In this chapter, I consider the methods used within the present thesis. The benefits and challenges of the TCE as a framework and how this factors into the data collection methods will be discussed.

Chapter Three describes an exploratory qualitative study using semi-structured interviews and focus groups to explicate subjective understandings of emotion and ER processes, drawing on the lived experiences of participants. This study laid the foundations for the remainder of the thesis as two specific strategies - venting and swearing - were chosen to be investigated for their regulatory functions based on reported prevalence of strategy use in the sample and the ease of behaviour operationalisation.

Chapter Four outlines the design and measures used in the quantitative studies. Drawing on the findings from the qualitative study, an appropriate emotion elicitation paradigm was chosen. The studies used Cyberball (K. D. Williams & Jarvis, 2006). Cyberball was used as it reflected the contextual and situational nuances reflected in the everyday lived experiences of participants, namely the impact of negative social interactions and the experience of emotional pain, and is a paradigm which is well evidenced in specifically generating social and emotional pain in the empirical literature.

Chapters Five and Seven introduce the two quantitative studies investigating the efficacy of venting and swearing as speech-based ER strategies, as indicated in Chapter 2. Both of these chapters will refer back to the methodological underpinnings presented in Chapter 4. These chapters present the findings from analyses of group differences in psychological and physiological outcomes between use of either the ER strategy or a distractor task. The findings were discussed within the context of emotion theory, providing a broad explanation for the mediating factors and intrapersonal processes which promote strategy use and facilitate adaptive regulation.

Chapter Six outlines the translation and validation of the Positive and Negative Affect Schedule – Extended (Watson & Clark, 1994) into Dutch. As the study presented in Chapter Seven was undertaken as an international collaboration between Keele University and Tilburg University and drew participants from a multilinguistic sample, a valid emotion measurement scale needed to be created to ensure the collected data was error-free and truly reflected the emotion processes occurring during the experimental paradigm.

Chapter Eight concludes the thesis with a discussion of the research findings, weaving the results and inferences from each stand-alone empirical study to provide a holistic overview of the studied phenomenon and implications for emotion theory research in the future.

Chapter Two: Epistemology and Methodological Approach

In the previous chapter, I reviewed the existing empirical literature investigating emotion experience and regulation in everyday life for non-clinical populations, focussing on speech-based regulatory strategies in particular, and identified the gaps that I intend to address in this thesis (see Chapter One for discussion). The identified gaps were: a need (1) for a comprehensive understanding of how emotions and regulation are perceived and occur in the everyday lives of non-clinical populations; (2) for sensitive emotion measurement practices to be used to better assess the complex dynamics of emotion experience and regulation; and (3) for contextualised mechanistic models to be explored in empirical research. The thesis aims to bridge these gaps through the triangulation of four distinct but integrated studies: qualitative exploration (Chapter Three), lab-based empirical studies (Chapters Five and Seven), and a scale validation project (Chapter Six). These studies were undertaken sequentially, with the qualitative exploration informing the methodology and scope of the later quantitative studies. To reflect this approach, in the current chapter I will present the arguments for the methodology taken in a similar sequential fashion. I will start with considerations that impacted the thesis as a whole, namely the epistemological position (2.1 and 2.2) and theoretical framework (2.3 and 2.4) underpinning the project. I will then outline the considerations made for the mixed methodology paradigm (2.5), turning then to the reflexivity underpinning the qualitative enquiry (2.6) and concluding with an articulation of the methodological decisions underpinning the quantitative studies (2.7). The details relating to each specific methodology will be discussed in the relevant empirical chapter (Chapters Three to Seven).

2.1 Epistemology

The current thesis' theoretical framework of the theory of constructed emotion (TCE; Barrett, 2017b; see 1.2.2 for discussion) is underpinned by the epistemology of psychological constructivism (Gendron & Barrett, 2009). Psychological constructivism stands in opposition to the 'common sense' approach to psychology (Barrett & Westlin, 2021), which has previously used essentialist psychology – that is, understanding the mind as a collection of separate and independent faculties which each reflect separate processes and have distinct physical properties – to underpin explanatory frameworks (Barrett & Russell, 2015); see 1.2.1 for discussion on essentialism and emotion). Despite the prevalence of essentialism within psychology, psychological constructivism has been used to explain emotions and other qualia since the inception of psychology (Darwin, 1872; James, 1884). Darwin (1872), in his writings on the expression of emotion in humans and animals, outlined a belief that emotions are functional states which combine multiple physiological and psychological processes to meet a goal or which occur as an instinct. Subsequently, William James argued that the functional states identified as specific emotion categories are subjective groupings denoted only by linguistic markers (James, 1884). James further reasoned that there are no limits to the number of possible emotions and emotion groupings in existence. He argued that due to their entirely subjective nature, these groupings could not support scientific inference or induction. Indeed, due to their inherent subjectivity, James believed that a classification approach would only yield a domain of enquiry that explained one subjective experience of the world and that it would not be more valid than any other classification or experience of emotions. Hence, James believed an essentialist exploration of emotion is unable to provide robust results which are reliable and generalizable as it assumes the subjective is objective.

As an alternative to essentialist psychology, James (1884) proposed an early form of psychological constructivism. Psychological constructivism is founded on the principle that models, knowledge, and systems of meaning are constructed by the individual (van Bergen & Parsell, 2019). According to Piaget (1970, 1973), knowledge is relative and actively constructed based on the individual's current knowledge and understandings of reality, as well as their subjective interests, past experiences, goals/motivations, and prior knowledge. Such knowledge may be shared and agreed upon within social groupings, for example, family members share related – but not necessarily identical – assumptions and models of the world. Psychological constructivism thus denies the intuition that all instances of the

English language emotion 'joy' or the Baining emotion '*awumbuk*' (Fajans, 1983; see 1.2.2 for discussion) are highly similar because they are related to a hidden common faculty or process (e.g., neural circuit), but instead assumes that 'joy' or '*awumbuk*' are actively constructed as a stream of psychophysiological and cognitive activity via the integration of domain-general processes. Therefore, psychological constructivists are not concerned about identifying singular faculties of a phenomenon but are instead interested in formulating individualised mechanistic models and identifying patterns that generalise across populations. In the context of my research, I approached emotion regulation (ER) as the culmination of multifactorial processes which may be understood as a stochastic mechanism, using the TCE (Barrett, 2017b) and psychological constructivism to inform methodological decisions (see 2.2 for further discussion); thereby addressing the third identified research gap by creating a contextualised model of the studied phenomenon.

Psychological constructivism assumes that knowledge and the construction of meaningful models are linguistically mediated (Willig, 2008). Language does not provide a simple read out of our internal psychological and emotional states, rather it is a principal means by which humans construct our internal models of the world (Burr & Dick, 2017) and by which individuals build socially agreed understandings of internal phenomena (Wittgenstein, 1953). According to Wittgenstein (1953), the identification of emotional states is a private state, only available to the individual experiencing the emotion. There is no objective mechanism that establishes a direct correspondence between external measures and internal states (Mascolo, 2009). The use of linguistic markers, such as '*awumbuk*', reference socially agreed public criteria which establish shared meaning (Wittgenstein, 1953). Thus, language and the socially agreed criteria associated with each specific linguistic marker wholly shape how an emotion and the associated eliciting event are constructed and understood by the individual.

2.2 Psychological Constructivism as a Methodological Research Programme

Psychological constructivism has been described as a research programme (Barrett & Russell, 2015). Research programmes were first developed by Lakatos (1978) and offer a methodological approach, including a package of ideas, methods, and habits of scientific thought and action. According to Lakatos (1978), scientific evaluation should not prize individual theory, but the sequence of theories: the research programme. Thus, research programmes are a historical entity (Godfrey-Smith, 2003). They evolve over time, with theories developed to address inconsistencies or expand the application of previous theories. For Lakatos (1978), it was justifiable for empirical anomalies to occur, as the research programme could evolve to more adequately explain reality. Therefore, a research programme does not necessarily need to fully explain an entire phenomenon as long as there continue to be avenues for modification, explanation, or rejection of theories.

To explain phenomena, a research programme has two main components (Godfrey-Smith, 2003). First, the hard core: a basic set of ideas that are essential to the research programmes. The hard core is not necessarily empirically falsifiable. Second, the protective belt: the auxiliary hypotheses which apply the hard core to actual phenomena and accommodate predictive failures. The protective belt allows hypotheses to be made and used to form inferences about the hard core. Empirical hypotheses use phenomena or ideas from the protective belt to falsify the predictions from the hard core to make scientific progress.

The principles of scientific progress, according to Lakatos (1978) are two-fold. Firstly, changes should only be made to the protective belt, never to the hard core (Godfrey-Smith, 2003). Secondly, changes to the protective belt must be progressive; expanding its application to a larger set of cases or refining into a more precise theory. A progressive research programme increases its predictive power and provides a stream of hypotheses while simultaneously eschews refutation. A degenerating research programme makes ad hoc modifications in the face of existing anomalies and cannot integrate new evidence into the protective belt; with empirical investigations thus focused on replication attempts or bolstering prior findings.

A degenerating research programme has been described as a row boat that has several leaks in it (Clark, 2019). In this analogy, the rower spends more time attending to the leaks to avoid sinking, than to rowing the boat to the intended destination. Under repeated failures to replicate findings or refine theory, a degenerating research programme reaches a point where no evidence can support the protective belt and as such the truth-value of the theory should be rejected. It is noteworthy that Lakatosian theory encourages researchers to be critical of their criticism. No single observation is sufficient in rendering a research programme as degenerating or false, as in Popper's (1963) Falsificationism which advocates for hard tests of theory. Instead, an emphasis is placed on formulating a well-structured and theoretically informed research programme which can rigorously test or refine theory. As such, many research programmes can exist simultaneously in any given field; Lakatos (1978) saw this as compatible with scientific progress as it allows for the contrasting of inference or induction using different methodological approaches. It is therefore important to consider how any given collection of studies enables a progressive research programme to occur. I will discuss how I have approached this for the present thesis below.

2.3 The Theory of Constructed Emotion as a Research Programme

To sustain progress, research programmes consist of methodological rules: the paths researchers should avoid (negative heuristic) and those researchers should pursue (positive heuristic; Lakatos, 1976). These heuristics are specific to the particular research programme. In the context of my thesis, these methodological rules were informed by the TCE (Barrett, 2017b). Thus, it is important to outline how the theory of constructed emotion operates in line with the assumptions of Lakatos' (1978) research programmes approach and how this has informed the present research. I will firstly outline the hard core of TCE and subsequently outline methodological decisions made in line with these. The TCE (Barrett, 2017b) has a hard core that claims that emotions are constructed from a multiplicity of more basic psychological processes based on predictive processes; that variation within and between instances of an emotion are the norm; and that emotions are thus not a unitary or distinct neural event (see 1.2.2). Changes in autonomic responding and neurological activation are assumed to be due mostly to predictive processing and goal orientation. The protective belt is made up of a shifting set of more detailed ideas about which internal and external cues predict responding on an intraindividual basis; variation; cultural relativity; affective chronometry; and so on (see 1.2 for overview). The core concept of intra- and inter-individual variability impacts the present research via two primary pathways.

Firstly, due to the inherent variability within and between individuals in emotion elicitation, specifically considering the lack of precision with which a target emotion can be reliably induced according to TCE (Barrett, 2017a), the present thesis will not investigate a particular emotion type or presume to elicit a specific emotion state. This impacted the qualitative and quantitative enquiries differentially.

As previously stated (see 1.4), the aim of the qualitative study was to (1) explore how emotions and ER are understood, (2) identify which speech-based ER strategies are used in the daily lives of non-clinical populations and (3) examine how contextual affordances impact regulation success. In this study participants were invited to freely select and discuss any emotion population, eliciting event, or speech behaviour that was salient at the time of interview. It was not assumed that any individual's response would correlate in a 1:1 fashion with any other individual's descriptions or reports. Rather, the study aimed to collect a corpus of data reflecting the everyday emotional experiences of non-clinical populations which could be inductively analysed to yield stochastic patterns of emotional experience or responding. These patterns would then be used to inform the subsequent quantitative studies.

The aim of the quantitative studies (see 1.4) was to evaluate the efficacy of the identified speech behaviours – venting and swearing (see 2.5) – in regulating subjective and physiological emotion response systems. To measure state emotion empirically, in the present thesis psychophysiological measures and the self-report measure of the Positive and Negative Affect Schedule – Extended (PANAS-X; Watson & Clark, 1999; see Chapter

Four for discussion) are used. According to TCE, classifiers should not be applied to psychophysiological measures of emotion, meaning that a solution or pattern should not be pre-stipulated. Instead, the available pattern should be described by the researcher within the results and subsequent discussion (Azari et al., 2020). Such patterns can then be clustered by data-driven approaches if appropriate. Clustering can then serve to reflect reliable categories of autonomic responding in response to a given context, goal, or methodology. For both measures of emotion, in line with the epistemological framework, no category of emotion is assumed to occur in each participant at any point in the research process.

Secondly, it is assumed that due to the lack of directionality and the variability of an emotional event, in line with the TCE core belt, it is necessary to capture and model multiple modalities of emotion and combine them using a causal indicator model (Quigley et al., 2014). Within a causal indicator model, instances of an emotion can vary from others within the same population without violating the assumptions of the latent construct model (K. Bollen & Lennox, 1991) or the hard core. It is assumed that the outcome measures will not necessarily correlate with each other, but instead can be aggregated to constitute an instance of the latent construct being investigated (Quigley et al., 2014), with anomalies integrated into the understandings of ER and the theoretical protective belt to ensure that the present thesis remains a progressive research programme and attends to the third research gap of contextualised mechanistic models. Thus, the present research project does not stipulate any hypotheses regarding the interaction or correlation between self-report measures of emotion (i.e. PANAS-X; Watson & Clark, 1994) and physiological variables (i.e. heart rate variability). The outcome measures were aggregated by experimental group, however, to assess the available evidence for ER (e.g., by changes to either or both self-report and physiological measures of emotion).

2.4 The Psychological Constructivism of Everyday Life

The present research project focuses on the effect of speech on emotions elicited during everyday life. According to psychological constructivism, models of the world are constructed through everyday interactions and are sustained by everyday social processes and cultural specific paradigms (Burr & Dick, 2017). Not unlike the broad categorisation of emotion (see Chapter 1 for discussion on emotion), the concept of *everyday* is both amorphous and ambiguous. Everyday life is everywhere and nowhere. It lacks clear boundaries; it is the habitual, the ordinary, and the statistically established (Blanchot & Hanson, 1987). Everyday life is the essential, taken-for-granted continuum of mundane activities which juxtaposes our more exceptional or esoteric life events (Felski, 2000). The distinctiveness of the everyday lies, in fact, in its lack of distinction and differentiation. Everyday life has been described as the obscure background of social activity (Certeau, 1984) and as the common denominator for all psychological and sociological processes (Lefebvre & Levich, 1987). The combination of a lack of defined concept, its material invisibility, and the banality of everyday life has ensured that the everyday has rarely been empirically scrutinised, thus ensuring a large gap in understandings of the very building blocks of psychological and emotional life. As such, it is vital to turn our attention to the everyday to improve our understandings of actual emotion and regulation phenomena. As the qualitative enquiry is solely concerned with everyday experience, this concept must be fully delineated. Within the present thesis, the *everyday* is understood to be best defined by two core components: repetition and typification.

Repetition. Everyday life is a temporal term (Felski, 2000). According to the philosophers Lefebvre and Levich (1987), the everyday has always existed but our focus on the everyday has only recently become an active pursuit. The everyday conveys an essence of repetition; referring not to a singular or unique event but to that which occurs cyclically day-after-day and night-after-night. The everyday activities of sleeping, eating, and socialising – amongst others – conform to regular diurnal rhythms which are embedded within larger cycles of repetition: the working week, the semester, the academic year. Hence, members within the same systems of repetition are likely to experience similar patterns of everyday behaviours.

Such repetition thus lends itself to the formation of habits. The everyday is synonymous with habit and routine (Felski, 2000). It is the self-evident routine act of conducting one's day-to-day existence without actively attending to it (Berger Peter & Luckmann, 1966). Everyday acts are generally regarded as automatic processes without which individuals would be paralysed by potential choice and unable to engage in daily activities (Heller, 2015). Habits are thus suggested to constitute an essential part of our everyday lives; providing a rhythm to routines across a plurality of contexts. While each event will differ in its minutiae, the essence of the event will repeat within one's everyday life. For example, while the stimulus which elicits social sharing of emotion may differ between each given instance, the essence of social sharing of emotion will remain coherent and constitute a cyclical pattern of behaviour. Therefore, to be deemed an *everyday experience*, the event must occur repeatedly and habitually across an individual's life.

Typification. Typification is theorised to be the primary mechanism through which everyday objects, persons, or events are perceived and categorised into types present in the individual's familiar world (Garfinkel, 2016; Kosik, 2012; Schutz, 1964). Familiarisation is the process whereby novel stimuli are perceived in reference to a reserve of previous everyday events, relating to both first-hand (i.e. personally experienced) and socially-shared second-hand (i.e. experienced by another person) experiences (Schutz, 1976).

According to Piaget (2013), at the cognitive level, new information is attached to pre-existing categories via the mechanism of assimilation-accommodation. These categories are socially formed, meaning that comprehension and understanding of each category is socially shared and disseminated. Thus, typification allows objects, persons, and events to be assimilated into broader and known socially agreed categories, and therefore become familiar within everyday life (Karapostolis, 1985). For example, I define the unique individual who has critically commented on this thesis as a 'thesis supervisor', because I know *ex-ante* how she acts and behaves towards this thesis, and the action and behaviours I associate with the thematic schema of 'thesis supervisor'. Whilst the individual will also belong to a potential multiplicity of intersecting types (Kosik, 2012), such as her gender or ethnicity, by integrating her into a pre-existing thematically informed typology, the individual can identify and respond to that which is ordinary differentially from that which is extraordinary and thus is not integrated into a familiar thematic typology. Thus, for an object, person, or event to be associated with *everyday life*, it must exist as a consistent type that occurs with regularity across members of the same social group. When applying typification to emotion populations, an emotion population is typified through familiar elicitation antecedents, functions, and emotion components (see 1.2.2 for discussion) and is socially agreed upon across individuals within the same social group.

In summary, everyday life is a way of experiencing the world according to repetitive habits and familiar typologies in a taken-for-granted manner. These habits and typologies are likely to co-occur within individuals within the same systems and social groups. Everyday life is the lived process of repetition and typification which all individuals can experience and which provide the backdrop for all aspects of human experience.

2.4.1 Understanding of Everyday Emotions

As discussed above, an *everyday* event is something that occurs repeatedly and is associated with a typified schema. When considering everyday emotions, the theory of constructed emotion (TCE; Barrett, 2017b; see 1.2.2 for discussion) does not outline which emotions are more or less likely to occur on an everyday basis. Instances of any given emotion are theorised to share a goal-orientated function within a specific situation, but the features of each emotion event are highly variable across instances and are context-dependent (Hoemann et al., 2019). When considering the everyday antecedents of ER in 110 German university students, as measured by experience sampling, goal orientation predicted emotion experience and regulation (Wilms et al., 2020). Thus, within everyday life, I argue that it is not the emotion itself that renders it as an everyday emotion. Rather, it is the individual's goals that dictate the emotions felt on an everyday basis. In line with the epistemological position of the thesis, no singular typified emotion was explored. That is, feelings of joy or anger were not solely investigated as specific emotions were not a priori assumed to be an *everyday* emotion for every person. The present thesis invited participants to identify and engage with, either as part of a qualitative interview or a quantitative experiment, whichever emotion was focused upon and/or elicited.

2.4.2 Operationalisation of an Everyday Event

To assess the effect of regulation on an emotion, an emotion must be elicited in the individual. Such elicitation must occur reliably and the paradigm must be robustly evidenced to provide a firm framework from which inferences can be made. For the experimental paradigm, the everyday event of social ostracism was selected based on its identified repetitive occurrence and clear typification in everyday life, as evidenced from the empirical literature. Social ostracism is the act of excluding or ignoring another person (K. D. Williams, 2009), and is the most salient when the individual is ostracised from a group of same status peers (e.g., friends or siblings; Nezlek et al., 2015). Social ostracism has been evidenced to occur with high frequency in everyday life. Indeed, over a two-week period, the daily diary entries of 40 (Nezlek et al., 2012) and 64 (Nezlek et al., 2015) Australian adults indicated that each person experienced, on average, between 1.12 and 1.31 instances of social ostracism each day. Thus, I suggest that social ostracism is an event that is repetitive across one's life and is, therefore, an everyday event.

Irrespective of the minutiae of the situation, social ostracism is known to be a negative experience and is associated with the elicitation of negatively valenced emotions such as sadness, anger, loneliness, boredom, and social pain (Eisenberger et al., 2003; Jacoby & Sassenberg, 2009; K. D. Williams, 2009). There is a clear thematic type of ostracism that is identifiable by members of any given social group and is associated with the elicitation of negative emotion. Thus, social ostracism was used as the everyday paradigm for emotion elicitation in the quantitative studies in this thesis.

2.5 Methodological Approach

As discussed above, research programmes outline a series of methodological rules from which empirical work can be designed. Therefore, it is important to consider how these rules informed the data collection methods, processes, and analysis of the thesis.

2.5.1 Mixed Methods

Researchers have conventionally tended to exclusively adopt either a qualitative or quantitative research paradigm when investigating psychological phenomena (Teddlie & Tashakkori, n.d.). It has been suggested that using both approaches allows for a deeper understanding of any given topic (Creswell et al., 2003). While there are many potential definitions of mixed methods research, the definition provided by Tashakkori and Creswell (2007, p.4) is adopted: "research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of inquiry". That is, both qualitative and quantitative approaches are adopted within a research project to investigate the given phenomenon in an integrated way.

This thesis seeks to explore which speech-based ER strategies occur as a feature of everyday life, how contextual affordances promote or constrain strategy implementation, and assess the efficacy of ER associated with specific forms of spoken language in line with the TCE (Barrett, 2017b) and the PMER (Gross, 2015). Such an endeavour arguably necessitates the application of a mixed-methods approach to adequately capture and model the complex spectrum of emotion and regulation, and to triangulate findings (Creswell & Clark, 2017; Hult Khazaie, 2021). Mixed methods approaches have been suggested to be useful when undertaking explorations where the existing literature is inconclusive or fragmented, and/or where contextual affordances are under-researched (Venkatesh et al., 2013), such as in the case for speech-based ER (see 1.3.3). By employing a mixed-methods approach, the researcher is thus able to interject context into a research programme, thereby providing a holistic view including the circumstances which may or may not influence a given effect beyond that which could be observed using a single methodology. Furthermore, it has been argued that both quantitative and qualitative methodologies are insufficient as a mode of empirical enquiry when used singularly, but that the limitations of both approaches are ameliorated once combined (Creswell & Clark, 2017). Quantitative approaches arguably do not incorporate context or other intra/interindividual variables within a model, and the researcher's epistemology and reflexivity are rarely considered. Conversely, qualitative approaches are sensitive to contextual and individual variables, but the generalisability of findings is limited due to the subjective interpretation of data and the low levels of applicability to other contexts, settings, or groups (Creswell & Clark, 2017; Winter, 2000).

A mixed-methods approach was considered appropriate in addressing the identified research gap and for meeting the aims and questions of the present thesis. As previously discussed (see 1.3), despite the wealth of research in the field of ER, there is a research gap into the speech-based strategies and associated efficacy of behaviours actually used in everyday life. A fuller understanding of the perceptions and instances of ER is required to ensure scientific progression. Mixed methods approaches are used to obtain a more complete understanding of the investigated phenomenon (Flick, 1992). Due to the identified research gap in ER research, I believe this signals the need for explorative qualitative research aimed at understanding, describing, and testing actual behaviours to help modify or substantiate theory-driven (i.e. deductive approaches, guided by the TCE [Barrett, 2017b] and psychological constructivism) and theory developing (i.e. inductive) ER research.

This adopted approach allows for both broad and deep understandings, and provides unique insights from multiple perspectives into emotion and ER and thus addresses the first research gap of needing a greater understanding of emotions and regulation in everyday life. It also allowed the insights obtained within the qualitative study to be subsequently empirically investigated, enabling different aspects of the same phenomenon to be revealed in a complementary manner (Flick et al., 2015). There has only been one study reported before the onset of the present research project (Gross, et al., 2006; see 1.3 for discussion) which used a mixed-methods approach in investigating ER in non-clinical populations. As such, the present thesis will contribute to knowledge by applying a mixed-methods approach to this field of psychology.

2.5.2 Qualitative Methods

2.5.2.1 Reflexivity

Reflexivity is the process of critical self-reflection through which researchers consider their position as a research instrument (Finlay, 2002). In general, as a research instrument, the researcher brings her own views, values, beliefs, assumptions, and feelings to the research, as well as her own intersectional identities; all of which have an impact upon research processes and outcomes. Personal characteristics, lived experiences, and the disciplinary background of the researcher can affect the questions asked, the language used, and the lenses adopted, which, in turn, shapes the findings and conclusions of the research (R. Berger, 2015). Reflexivity is the continuous examination and explanation of the researcher's influence as an active instrument (Dowling, 2008). By providing an explicit understanding of how one's positionality and interests affect all stages of the research (Primeau, 2003), the credibility and transparency of the research is increased (Cope, 2014). The following subsections provide a critical reflection of my personal characteristics, and epistemological decisions which may have influenced the research process for Study One (for further reflexivity contemplating on the research process and results of Study One, see 3.4.4).

Personal Characteristics.

Emotion experiences are incredibly idiosyncratic and each of us are unable to access the feelings or experiences of another person. As such, we each only have our limited experiences from which to extrapolate inferences about emotions. Before I developed this study, I was unaware of how much I take my own limited subjective experience as the definitive way of being. It soon became apparent that this was not the case, and I was mindful that I must avoid making assumptions about others' lived experience in favour of my own. This was difficult for me as emotions are a large part of my everyday life; I am generally someone who feels emotions quite deeply, and I have a clear understanding of how emotions feel for me. I overcame this challenge by interviewing using decolonised methodologies which are embodied from the heart and which ensure that the researcher does not shy away from becoming a vulnerable observer (Pelias, 2004). This approach requires the researcher to think beyond the self and to act as an engaged, authentic, and empathetic listener, even if one struggles to understand or accept the discourse being presented. This was important for me when discussing experiences of emotion antithetical to those of my own, such as when participants described their embodied experiences of emotion or how they use specific speech-based emotion regulatory behaviours. This necessitated recognising and honouring my own and others' emotions, and to actively relate the two through the interview process (Vannini & Gladue, 2008). At times, when appropriate, I used reflexive dyadic interviewing (Ellis & Berger, 2003). Reflexive dyadic interviewing is an approach that allows the interviewer to share her own experiences with the participant and to reflect on these as part of the interview. This is theorised to support connection between interviewer and participant by fostering openness and recognises the value and meaning of sharing (Vannini & Gladue, 2008). For me, this felt like the most natural approach to interviewing. Emotions are an incredibly personal phenomenon that can be dismissed or minimised easily by other people when the other's experience does not align with one's own. By using reflexive dyadic interviewing I was able to foster a space where emotions were authentically celebrated and honoured, and allowed me to understand the participant in reference to my experiences.

Epistemological Reflexivity.

Epistemological reflexivity does not solely pertain to methodological considerations. When undertaking qualitative research, the researcher needs to consider the epistemological framework which will underpin analysis. Within the qualitative study, as speaking about emotions is assumed to be a gendered – that is, feminine – pursuit (Lefkowich, 2019), I was sensitive to how my identity as a cis-gendered female may have impacted disclosure. It is not controversial to suggest that an individual's day-to-day lived experiences are not separable from their intersecting identities, such as gender identity and race, or from the socio-historical context. For example, in the case of emotions, the meaning of 'anger' changes depending on the historical period and social location of the individual. In white and Western cultures, for instance, anger is seen as morally problematic as it focuses attention narcissistically on the self and requires retribution in a manner that is antithetical to justice (Kay & Banet-Weiser, 2019). Conversely, in Black communities within Western cultures, anger is seen as a productive resource that can promote societal progress and provide a voice for marginalised groups (Lorde, 1997). Thus, the experience of anger in two sub-communities within the same culture differs based on a multitude of social processes, but none of these experiences are privileged or truer than the other. By approaching emotions in this way, the researcher can acknowledge the specific, local, personal and community forms of truth which underlie lived experiences, and also recognises that all knowledge gained through the scientific process is partial or situated within socio-historical or situational contexts (Kvale, 1995). The sensitive approach taken allowed me to focus the research on daily lived experiences and associated behaviours of the individual within the context of their social and linguistic experiences; all of which are central facets to the theoretical framework of the doctoral research – the TCE (Barrett, 2017b).

I used both semi-structured interviews and focus group discussions to allow for triangulation to occur, as informed by the complementarity model (Kelle, 2005). Complementarity models of triangulation are argued to build a richer picture of research results by allowing the results from different methods to inform and complement each other, and – in line with assumptions of Lakatosian research programmes (see 2.2) – divergent results are not assumed to disprove an effect or result but rather provide a more nuanced account of the phenomenon (Nightingale, 2020). When undertaking emotion work, such as discussing events and experiences, disclosures made in a one-to-one private environment and those disclosed within a group setting are likely to differ. This relates not only to the number of disclosures, as previous research (Kruger et al., 2019) comparing the total number of disclosures made between interviews (N=518) and focus groups (N=194) indicate a disparity between these values, but also to the depth of disclosures made. Focus groups have been identified as being a less appropriate tool for the disclosure of personal or sensitive information, such as emotion experiences (Powell & Single, 1996). Thus, it is not assumed that the findings from the interviews and focus groups will converge (i.e. agree with each other), nor necessary diverge. Rather, the data collected in the focus groups will provide the opportunity for more general ideas about emotions and regulation to be teased apart socially in a manner that will complement the more personal disclosures made in the interviews.

2.5.4 Quantitative Methods

2.5.4.1 Emotion Elicitation Approach

As previously argued (see 1.2 and 2.3), theoretically informed and valid emotion elicitation procedures should elicit an actual emotion, as opposed to simulating or recalling an emotion experience. It is, therefore, vital to consider how emotions will be elicited in the quantitative studies contained in the present thesis (Chapters Five and Seven). While it is recognised that lab-based inductions of emotion may not fully represent the actual experiences of everyday life in non-clinical populations, lab-based investigations can provide insights into affective functioning and may highlight how and why regulation occurs (Seeley et al., 2015). Affect program theory holds that regulation strategies are likely to be efficacious across situations and contexts if there is an overlap of characteristics between any given experience (Ekman, 2018). That is, if an available contextual variable in the present emotion eliciting scenario is extant in a prior learnt experience, the regulation strategy used is likely to be effective in regulating the current affective experience. It is therefore suggested that if a lab-based emotion elicitation paradigm contains similar features to that of an actual emotion elicitation experience, the emotion is likely to be regulated by the same mechanisms and the outcomes measurable in the same way as an emotion elicited during everyday life.

One of the primary existential concerns faced by humans is the need to belong to a group (Leary & Baumeister, 2000). Hence, social ostracism is an event that has particularly serious implications for psychosocial resources. Being socially excluded has been found to affect an individual's sense of belonging and also decrease self-reported levels of self-esteem, control, and meaning in life (K. D. Williams & Sommer, 1997). Indeed, after experiencing ostracism, individuals report high levels of negative state emotion and violations to these basic needs (Eisenberger et al., 2003; Zadro et al., 2004). Williams (2009) suggests that these effects occur immediately after exclusionary events, as part of a *reflexive* stage of ostracism. If the event is not modified, individuals enter a *reflective* stage where they enact appraisal behaviours to attribute meaning to the event and to reconstruct levels of their basic needs. If the ostracism event persists, individuals then enter the *resignation* stage, where they will experience alienation from the social group and adverse psychological outcomes (e.g., low mood). Human reflexive and reflective reactions to social ostracism are wide-ranging, but include pro-social or even aggressive behaviours (Hartgerink et al., 2015). Whilst the consequences of social ostracism vary, it is widely accepted in the literature that social exclusion is emotionally painful, results in feelings of distress, and increased negative state emotion (Bernstein & Claypool, 2012; DeWall et al., 2011). This is known as 'social pain'.

A wealth of studies have been conducted in which participants are ostracised during functional magnetic response imaging experiments (for a review, see Cacioppo et al., 2013; Eisenberger, 2012). Many of these studies link activation in the anterior cingulate cortex (ACC) – a brain region associated with experiences of physical pain (Zhang et al., 2019) – with experiences of social exclusion. Eisenberger (2015) argues that the associated activation of the ACC corresponds to the experience of *social pain* felt during and after social ostracism. That is, it accounts for the negatively valenced state emotionality experienced following rejection or exclusion. This hypothesis is based on the assumption that social pain relies on – or at least shares some of – the same neural and cognitive pathways of physical pain. This association has further been supported by correlational evidence between the induction of both physical and social pain. For instance, baseline levels of heat pain tolerance predicted self-reported social distress after exclusion from an online ball-tossing game in 75 American undergraduate students (Eisenberger et al., 2006). Participants who were less able to tolerate the painful stimulus, delivered via a handheld probe heated to 51 degrees Celsius, were significantly more likely to self-report greater threat to their self-esteem, belongingness, control, and life meaning as measured by the fundamental needs questionnaire (see 4.4.3.2 for questionnaire details; Gonsalkorale & Williams, 2007). These results led the authors to conclude that pain distress and social distress share neurocognitive substrates. While the underlying functions of this overlap are as yet unclear, it has been suggested that through evolution, as animals evolved to become more social, the same physiological events used to monitor physical events were co-opted to moderate social events (Panksepp, 1998), and in doing so promoted social cohesion and agent survival. This hypothesis is known as the social-physical pain overlap theory (Eisenberger, 2012).

The social-physical pain overlap theory is further supported by other findings in the literature on ostracism. For instance, during an online ball-tossing game where 138 undergraduate students were excluded from an online ball-tossing game (Cyberball; see 4.4.1), participants who took ibuprofen reported feeling less negative on the Positive and Negative Affect Schedule (Watson & Clark, 1994) than those who took a placebo (Vangelisti et al., 2014). Similar results are available from a correlational study (DeWall et al., 2010), in which 62 participants took either two 500-mg paracetamol or two placebo tablets over three days and self-reported levels of negative emotion experienced each day. Doses of paracetamol were found to reduce daily self-reported negative emotion when compared to doses of the placebo. As interventions for physical pain appear to be effective in reducing social pain, the available evidence appears to be consistent with the social-physical pain overlap theory. Thus, it is argued that when a threat to belonging is presented (i.e. the individual is ostracised socially), they will suffer social pain which requires regulating to return to a more optimum experiential state.

However, there is available evidence that social ostracism does not necessarily influence mood or state emotion (DeWall & Baumeister, 2006). Williams (2002) reported that, despite finding significant effects of social ostracism on state emotion, other participants responded neutrally as “though they had been hit with a stun gun” (p. 159). Often when an effect of mood is found, the results frequently indicate responses at or around the scale midpoint, which may reflect a neutral state (Twenge, Catanese, & Baumeister, 2003). This potential counter-intuitive finding has since been interpreted as one consistent with opioid release in the body. Endogenous opioids (e.g., morphine) are recognised as having regulatory functions for physical pain (MacDonald & Leary, 2005). As interventions for physical pain have been found to also influence experiences of social pain, it is hypothesised that the body releases opioids in response to social pain. Opioid release thus leads to a numbing reaction – a form of social pain regulation – and is experienced subjectively as a neutral emotional state. There is some evidence for this assertion in the literature. For example, when 82 American adults, sampled from a non-clinical population, were administered either an opioid blocker or a placebo, doses of the opioid blocker were associated with lower levels of self-reported social connection towards close others (e.g. family, friends) than doses of the placebo (Inagaki et al., 2020). While, disparately, socially rewarding outcomes have been found to block endogenous opioid receptors in primates (Martel et al., 1995) and rodents (Panksepp et al., 1980). Thus, this hypothesis is consistent with the social-physical pain overlap model and may help explain feelings of neutrality reported by some individuals following social ostracism.

A simple and well-evidenced (see above) method of inducing social pain in a laboratory setting is Cyberball (Williams et al., 2000; see 4.3 for discussion on how Cyberball is used in the present thesis). Cyberball is an experimental paradigm, ostensibly a simulated ball-tossing game, in which participants believe they are throwing a ball to up to four other players. Where participants in the control group are included in the to-and-from of ball-tossing as equally as the other players, participants in the experimental group become ostracised by the other players and excluded from gameplay, often receiving 10% of all ball tosses over the course of a game. The ostracism game consequently comprises a prolonged ostracism event in which several players exclude the participant, and which has been reliably demonstrated to result in negative state emotion and decreased basic needs compared to Cyberball inclusion and other ostracism paradigms (Bernstein & Claypool, 2012). Across 120 experiments, Cyberball has been evidenced to reliably induce a large effect of social ostracism, resulting in social pain, irrespective of participant age, gender, or country of origin (Hartgerink et al., 2015). Therefore, Cyberball was chosen as the emotion elicitation paradigm in the quantitative studies as there is strong evidence that it induces the desired effect whilst also allowing for replicable and consistent laboratory conditions across participants.

2.5.4.2 Emotion Regulation Strategy

The ER strategies used in the quantitative studies were identified in the qualitative enquiry (Chapter Three). The strategies – venting and swearing – will be introduced here to allow for a complete overview of the thesis. However, both strategies will be fully discussed in Chapters Five and Seven. Both behaviours were selected based on participant accounts from the qualitative study (Chapter Three) which identified both venting and swearing as having the propensity to regulate highly intense emotions efficiently.

Venting.

The definition of venting has previously been argued to be nebulous and potentially referring to a wide range of conflicting behaviours (Burchard, 2001). Previously the definition of venting has encompassed actions of disclosure, explosive outbursts, or free verbal expression (Burchard, 2001). The lack of consensus of what venting is remains evident throughout the published literature, with each study conceptualising the construct of venting differently. Based on the findings of Study One, the following definition was formulated: venting is a form of expressive speech, used during experiences of high-intensity emotionality, which may fulfil regulatory functions.

Swearing.

Swearing is defined in the literature as a form of socially taboo language which expresses connotative or emotional information (Jay & Janschewitz, 2008). Taboos are topics that, based on social customs, are appraised as inappropriate for inclusion in discourse (Jay, 2009). The taboo categories which comprise swearing tend to involve bodily excretions, sex, and religion (K. Stapleton, 2010). Swearword use was described by participants as occurring primarily in response to high-intensity emotional experiences and that by using swearwords, one's emotional state could be modified.

2.5.4.3 Emotion Measurement

Based on recommendations from Barrett (Barrett & Westlin, 2021), the present study uses multimodal methods – specifically self-report and psychobiological measures – to index state emotion and subsequent regulation (see 4.4 for a more detailed discussion). Unlike most studies that use a unimodal form of emotion measurement, the present work will use both psychophysiological and self-report measures multiple emotion response systems. The present work used heart rate variability the Positive and Negative Affect Schedule – Extended (Watson & Clark, 1999) to index emotion response system change.

Physiology Response system: Heart Rate Variability.

Heart rate variability (HRV) is the variation in heart rate and is argued to reflect an individual's capacity for regulating cognitive, emotional, and behavioural processes to allow for the adaptive response to changing situational demands (Holzman & Bridgett, 2017). Of particular note for the present work, HRV is linked with emotion elicitation and regulation (Kreibig, 2010). Two models exist to explain cardiovascular and autonomic function to emotional outcomes: the polyvagal perspective (Porges, 2007) and the neurovisceral integration model (Thayer & Lane, 2000). After a brief overview of the cardiovascular system (2.5.3.1) and heart rate variability (2.5.3.2), these models will be discussed in turn (2.5.3.3 and 2.5.3.4), and I will conclude by outlining that the neurovisceral integration model will theoretically underpin HRV measurement in the present experimental studies.

The Cardiovascular System. Throughout a 24-hour period, the human heart beats an average of 100,000 times, culminating in approximately 2.5 billion beats across one's lifetime (Mccraty & Shaffer, 2015). Human hearts can be understood as two pumps operating in sequence: the right atrium and right ventricle, which pump blood from into the pulmonary circulation – that is, the arteries and veins which exchange gasses across the alveoli membrane in the lungs and the external environment (Levitzky, 2018) – for oxygenation, and the left atrium and left ventricle, which pump blood from the pulmonary circulation into the body (Katz, 2010). The sequence of the atrial and ventricular action constitutes the cardiac cycle (i.e. a heartbeat), divided into a ventricular systole (i.e. a contraction) and diastole (i.e. relaxation).

Systolic events are generated by the heart's autorhythmic pacemaker cells (Sperelakis, 2000); cells that generate regular, spontaneous action potentials and have no true resting potential (Shaffer et al., 2014). Cells within the sinoatrial node are the primary pacemakers that are responsible for initiating heartbeats at a rate of approximately 100-110 beats per minute (bpm). The actual number of heartbeats initiated are modulated via a dynamic balance between the sympathetic nervous system (SNS) and parasympathetic nervous system (PNS; Sperelakis, 2000). Activation of the SNS leads to acceleration of heart beat through norepinephrine and epinephrine antagonist stimulation. The release of these neurotransmitters reach the sinoatrial nodes through descending nerve fibres which consequently increase positive voltage within pacemaker cell ion channels (DiFrancesco et al., 2001). Where voltage is increased within cell ion channels, the threshold for reaching membrane potential (i.e. action potential) is decreased, thereby reducing the time required to reach threshold. Conversely, PNS stimulation leads to deceleration of heartrate via prefrontal cortical acetylcholine stimulation which decreases positive voltage in pacemaker cells. Acetylcholine reaches the sinoatrial nerve via the vagal nerve. Where voltage is decreased in cell ion channels, the threshold for reaching membrane potential is increased, thus increasing the time required to reach threshold. Thus, the cardiac neuronal system is comprised of spatially distributed cell states consisting of afferent, efferent, and interconnecting neurons which act as a control system (Triposkiadis et al., 2009).

Within a healthy system, regulation of the cardiovascular system occurs through the dynamic interplay of SNS and PNS activation. SNS stimulation is the principal mechanism through which heart rate is increased above the SA node's intrinsic level, that is above 100-110 bpm (Shaffer et al., 2014). SNS activation is responsible for controlling the body's reactions to stress or emergency, also known as the "fight-or-flight" response (Gordan et al., 2015). Where SNS activation dominance occurs, the heart's beat-to-beat fluctuations become shorter and more uniform (Dong, 2016). PNS stimulation predominates cardiac activity at rest, resulting in an average heart rate of 75 bpm (Shaffer et al., 2014); this is a significantly slower rate than the SA node's natural rate and is a response known as accentuated antagonism (Olshansky et al., 2008). The PNS is responsible for regulating the body's systems, such as urination and digestion, also known as the "rest-and-digest" response (Gordan et al., 2015). Where PNS activation dominance occurs, the heart's beat-to-beat fluctuations become longer and more varied. Thus, estimations of heart rate within a healthy system reflect the net effect of neuronal activity which influences the PNS vagus nerve, which slows heart rate, and the neuronal activity which travel down the SNS nerves, which accelerate heart rate (Triposkiadis et al., 2009).

Heart Rate Variability. While heart rate refers to the total number of cardiac cycles within a given time period, heart rate variability (HRV) refers to the fluctuation in time intervals, known as the inter-beat interval (IBI), between adjacent heartbeats at the millisecond level. HRV is considered a measure of neurocardiac function which reflects the heart-brain interactions occurring via nerve fibres culminating at the sinoatrial node (McCraty & Shaffer, 2015). Specifically, as prefrontal cortical activity affects PNS via descending pathways, HRV has been conceptualised as a measure of top-down self-regulation. Where the IBI fluctuations are greater, it is assumed that the body is in a state of PNS regulated "rest-and-digest" state. Conversely, where there is evidence of shorter and more uniform IBIs, it is assumed that the body is in a state of SNS bottom-up regulated "fight-or-flight" responding. Activity of the vagus, and the PNS by proxy, is typically approximated by measuring HRV in high-frequency bandwidths which quantify changes in IBIs at short time scales (see 4.4.2 for measurement procedure of present thesis).

Due to the assumed association between top-down and bottom-up regulatory processes, HRV is an emerging tool in studies on ER (Beauchaine, 2001). To date, HRV has been used primarily within correlational studies which investigate the relationship between resting HRV and an individual's self-reported capacity for regulating cognitive, emotional, and behavioural processes. Research has found that, in non-clinical samples, resting HRV – taken during a spontaneous breathing and resting state – correlates with self-reported levels of ER difficulty in 183 American undergraduate students (Williams et al., 2015), self-reported habitual state emotion and subjective well-being in 172 German undergraduate students (Geisler et al., 2010), and emotional stability in 439 Dutch undergraduate students (Koval et al., 2013). When considering the availability of a causal link between HRV and actual ER, at the time the studies contained within the present thesis were conceived, few studies have empirically explored how HRV responds following emotion elicitation and regulation. The present work therefore further provides a significant contribution to the literature by testing theoretical assumptions through empirical means in a manner that can add to this fledgling research area. Nevertheless, the link – theoretical or correlational – between emotion outcomes and HRV has allowed researchers to infer two primary models implicated in the development and maintenance of emotion processes, which will be discussed below.

Polyvagal theory. The polyvagal theory holds that two distinct vagal pathways evolved to motivate approach and avoidance behaviours (i.e. fight-or-flight) in response to evolutionary relevant stimuli (Porges, 2018). The phylogenetically older pathway originating in the dorsal motor nucleus – referred to by Porges (1995) as the vegetative vagus – is suggested to mediate reflexive cardiac activity, including deceleration of heart rate. It is hypothesised that this pathway evolved to conserve metabolic resources by ensuring the enactment of immobilising behaviours (e.g. freezing). In contrast, the newer pathway – the smart vagus – which originates in the nucleus ambiguuus is theorised to mediate cardiac activity to promote mobilisation behaviours (e.g., fight or flight) in line with situational demands (Porges, 2003). It is suggested that behaviours related to emotion, such as regulation, are mobilisation/immobilisation behaviours and vagal nerve stimulation promotes the efficacy of such behaviours (Hastings et al., 2008). Notably, these behaviours are thought to include modulation of facial musculature associated with emotion. Such modulation is theorised to have allowed mammalian species to communicate complex emotional states which facilitates social engagement systems. Social engagement systems require both mobilisation and immobilisation of social behaviours for success. Hence, the polyvagal theory suggests that vagal nerve activation determines the range of emotional expressions which can be communicated via patterns of facial musculature changes and vocal communication, which in turn allows for social affiliation to occur and meaningful social structures to be developed through this mechanism.

I argue that the Polyvagal Theory (Porges, 1995) is incompatible with the theoretical framework of the present thesis. The above hypothesis seems to assume that there are specific and reliable facial expressions associated with any given state emotion. Thus, this approach stands in opposition to the TCE (Barrett, 2017b) which holds that variation in autonomic and behavioural (e.g., facial muscle) responding to emotion events is the norm, and that there are no reliable patterns of behaviour for any specific emotion population. While, according to Lakatosian (1978) research programmes (see 2.2), the hard core of Polyvagal Theory (Porges, 1995) – specifically the evolutionary perspective – may not be tested using experimental hypotheses, the wider evidence for specific and reliable patterns of facial musculature associated with emotion populations (see 1.2) would not support any related auxiliary hypotheses. As argued in Chapter One, there is limited evidence for this hypothesis, rather the literature suggests that expressions of emotion are governed by contextual and situational affordances rather than the eliciting emotion population. Even if one assumes that patterns of facial muscle movements correlate with specific emotion states, the available evidence for the role of vagal nerve stimulation and accurate emotion recognition is entirely theoretical for facial emotion communication or conflicting for emotion population recognition. For example, in research designed in line with polyvagal theoretical auxiliary hypotheses, which explored whether non-invasive stimulation of the vagus nerve improves emotion recognition in photos of posed facial expressions (Colzato et al., 2017; Sellaro et al., 2018), stimulation has been found to have a large effect (Sellaro et al., 2018) and no evidence of an effect on accurate emotion recognition (Colzato et al., 2017).

Given all that has been mentioned so far, I would further argue that the Polyvagal Theory is underpinned by teleological assumptions (see 1.2.1.1). *In precis*, teleology is the assumption that a process (e.g., vagal nerve stimulation) was designed (e.g., based on evolutionary requirements) to serve an adaptive purpose (e.g., social communication of emotion; Kelemen et al., 2013), and the causal evidence for such adaptions are largely based on metaphors or compelling but unsubstantiated arguments (e.g. vagal nerves fibres border those of facial nerves to mobilise emotion expression for social affiliation). Thus, I believe that the hypotheses related to polyvagal theory are persuasive based on argument and assumption, rather than empirical evidence, and is therefore incompatible with the approach of the TCE (Barrett, 2017b) and the present thesis.

Neurovisceral Integration Model. The neurovisceral integration model (NVM) proposes that the heart and prefrontal cortex are connected to the autonomic nervous system through a central autonomic network (CAN), which includes the vagal nerve (Thayer & Lane, 2000). The CAN is theorised to operate through a series of feedback and feedforward loops where both top-down information from the pre-frontal cortex and bottom-up information from the autonomic nervous system can mutually influence each other and mediate cardiac activity to meet situational goals (Shaffer et al., 2014). Such influence is theorised to occur primarily through inhibitory control processes over the amygdala which, in turn, peripherally obstructs PNS control over the vagal nerve (Appelhans & Luecken, 2006). There is some evidence for this proposal in the literature. For example, when 190 female, American undergraduate students (Butler et al., 2006) and 131 female, Australian undergraduates (Denson et al., 2011) were either instructed to regulate their emotions or received no instructions after exposure to a negative emotion eliciting film clip, participants who regulated their emotions demonstrated significantly greater HRV than those who did not explicitly regulate their emotions. While it is important to bear in mind that there is limited empirical evidence available that investigates the link between HRV and actual regulation, the findings available suggest that increases in HRV index PNS dominance which occurs due to explicit ER.

For this regulatory dynamic system to work effectively, it is theorised that the CAN ensures reciprocal feedback from multiple system components (e.g. pre-frontal cortex), is sensitive to the initial conditions of the system (e.g. previous state emotion), and has multiple potential response pathways (e.g. combinations of PNS and SNS activity; Thayer & Lane, 2000). From this perspective, the CAN can regulate the timing and magnitude of emotions through inhibitory control in line with contextual and situational demands (Appelhans & Luecken, 2006). This hypothesis aligns with the core belt of the TCE (Barrett, 2017b), in that psychophysiological responding and regulation is context-specific and cannot be parsed into patterns based on the associated state emotion. Thus, I argue that the NVM allows for auxiliary hypotheses to be made which can further test emotion phenomena, including regulation, consistent with the TCE (Barrett, 2017b) framework adopted in the present thesis. As such, the NVM will be used to underpin hypotheses and inferences made relating to HRV in the collection of empirical studies presented later in this work.

Subjective Experiential Response system: Positive and Negative Affect Schedule – Extended (Watson & Clark, 1999).

Barrett and Westin (2021) argue that from a constructed emotion approach it may be best to measure emotion via self-report as there is no ‘objective’ way of determining when someone is experiencing a particular emotional state. The Positive and Negative Affect Schedule – Extended (PANAS-X; Watson & Clark, 1999) was selected due to the wide range of 60 emotion items available, which can be analysed as two scales of general positive and negative affect or as 10 subscales of emotion populations, such as hostility or self-assurance, to disambiguate trends in self-report data across participants. By offering a large number of emotion states from which participants can self-identify to describe and quantify the intensity of their current emotional state, participant responses can be clustered by the theoretically stipulated latent factors (i.e. emotion populations) of the PANAS-X.

The PANAS-X allows participants to self-report emotions using a standardised list of emotion words which are assumed to refer to the same shared public criteria for each emotion state for all members of the same social group and thus exist in a similar or proximal semantic space (see affective circumplex, 1.2.2.3). It is important to note, as discussed in Chapter One, that the TCE (Barrett, 2017b) does not deny common experiences of subjective state emotion. Rather these experiences are assumed to be grouped by socially learnt linguistic markers and which correspond to specific regions on the affective circumplex. Thus, while there may be small deviations between participants and contexts for each emotion word, the PANAS-X allows participants to choose which emotions they are experiencing and the level of arousal for each emotion across 60 emotion categories.

2.5.4.4 Epistemological Reflexivity

It is important to embed reflexivity into quantitative research (Jamieson et al., 2022), as such I will reflect on the epistemological decisions made in the quantitative studies. Overall, the methodological decisions made in this project have been informed by the epistemological position and theoretical framework outlined previously (see 1.2. and 2.1 for discussion). However, in some instances, methodological decisions have been made due to pragmatic considerations. It is important to delineate the pragmatic methodological decisions and considerations of the thesis. Pragmatism in research ensures that the given research question, theory, or phenomenon is investigated using the most appropriate research method (Feilzer, 2010).

Social ostracism was selected as the everyday emotion eliciting event for the research paradigm (see 2.5.3). Social ostracism is most salient for individuals when they are isolated as part of a naturalistic interaction with a group of same status peers, such as friends or colleagues (Nezlek et al., 2015). There are, however, methodological considerations in designing an ostracism paradigm. Firstly, group dynamics differ depending on the individuals present and the relationships of group members in a manner that cannot be controlled for in a laboratory setting. Secondly, if using confederates or actors to ostracise participants, there are increased financial and time costs, added potential confounds of prosody or nonverbal behaviours, and no guarantee of increased ecological validity (Quigley et al., 2014). As such the research used computerised games of 'Cyberball' (Williams et al., 2000; see 4.7 for discussion) to induce social ostracism, with an acknowledgement that this is not a naturalistic group interaction. Cyberball is a virtual ball-tossing game in which the participant is either included or excluded from gameplay by two other computer players. Similarly, while the qualitative study provided evidence of a multitude of potential behaviours which could be quantitatively investigated, the behaviours of venting and swearing were selected based on their repetitive and pragmatic ease of operationalisation. Both spoken language behaviours have a consistent thematic schema which allows them to be recognisable as an everyday behaviour, are associated with habitual and as a type that can be easily operationalised within the laboratory setting.

Additionally, both psychological constructivism and the TCE (Barrett, 2017b) posit that language is important in identifying subjective groupings of phenomena, such as emotion populations. Part of the work undertaken in the present thesis occurred at Tilburg University in the Netherlands, under the guidance of Professor Ilja Van Beest (see Chapters Six and Seven). As such, participants for whom English was not their first language were recruited. To maintain underlying construct validity, measures which rely on language as a means of self-reporting state emotion, such as the PANAS-X (Watson & Clark, 1999), should be available in the participant's native language. Language is assumed to play a constitutive role in emotion perception and identification (Lindquist & Gendron, 2013) and there are many gaps or differences between the groupings of emotion categories between emotions (Watt-Smith, 2016). Without a culturally sensitive measure of emotion, the results cannot be assumed to be a reliable reflection of state emotionality. To maintain methodological consistency between the quantitative studies, the PANAS-X (Watson & Clark, 1999) was used as a self-report measure of state emotion. However, a validated version of the PANAS-X was not available. As part of this thesis, I developed and validated a Dutch version of the PANAS-X (PANAS-XD; see chapter six) to ensure the reliability of the study results.

2.6 Summary

This chapter has discussed the epistemology and methodological approach of the thesis. The research uses a mixed-methods approach, underpinned by psychological constructivism, to investigate whether and how speech-based ER is effective in everyday life. The methodological approach allows for the elaboration and contextualisation of emotion events and regulatory behaviours which have, as yet, been understudied in the discipline. It also allows the identified phenomena to be tested in a manner that yields rich understandings of complex qualia in a manner that is absent in the literature about ER in non-clinical populations. Specific details relating to each individual study and research method will be presented in the following five chapters (Chapters Three to Seven).

Chapter Three: Perceptions of Speech and Emotion Regulation

This chapter moves on from discussing emotion and emotion regulation (ER) quite broadly, as was done in Chapters One and Two, to empirically investigate the perceptions and actual instances of speech-based ER behaviours in the everyday lives of non-clinical populations through a qualitative study. As discussed in Chapter One, few studies have investigated lay individuals' first-order experiences of emotion and ER, and the intersection of this with speech. As previously discussed (see 1.3), ER research has tended to focus on a specific subsection of behaviours without systematically investigating the extent to which the employed paradigms reflect actual behaviour use in everyday life. This has tended to preclude the use of speech-based behaviours, even though speech is suggested to occur following 80-95% of emotional events (Nils & Rimé, 2012). As such, it is vital to explore how and why speech is used in response to these events and what outcomes are associated with the use of speech.

Despite the prevalence and utility of such behaviours, the use of speech as an ER strategy remains an under-explored research area and a mechanistic model of speech-based ER remains to be fully explained. Furthermore, due to deficit models, lay individuals have never been invited into academic spaces to help clarify and expand theoretical positions of emotion or ER. However, based on the ubiquity of speech use in response to emotional events, it is reasonable to suggest that the general public would, if given the opportunity, be able to wrestle with key concepts to improve scientific understandings of emotion and speech-based ER. Enquiries of this nature are justified because, when the reports of trait ER strategy use and compared to daily diary entries in 1,097 American adults, there were weak-to-moderate correlations between trait use and actual daily reported use for ER strategies (Koval et al., 2022). Thus suggesting that the current status quo of ER research may not adequately reflect actual ER in the daily lives of non-clinical samples. Accordingly, I believe that a qualitative investigation was warranted to explore understandings and experiences of emotion and ER, as well as the potential social and contextual moderating factors.

The present chapter will revisit the research aims of the present study (3.1). I will then discuss the methodology (3.2) and findings (3.3 & 3.4), which informed the subsequent two quantitative studies contained in the present thesis.

3.1 Study Aims

The aims of Study One were to (1) explore lay individuals' understandings of emotion and ER; (2) examine which speech-based behaviours are used as ER techniques; and (3) explore individuals' experiences of which parameters render specific speech-based ER behaviours as perceived as effective or ineffective. In line with standard practice in qualitative research, the present chapter will use the first-person perspective to analyse and discuss the data (Brodsky, 2008).

3.2 Methodology

3.2.1 Design

Semi-structured interviews (SSIs) and focus group discussions (FGDs) are forms of qualitative research that allow participants – either individually or within groups – to discuss subjective and complicated topics. SSIs are verbal interchanges where an interviewer tries to elicit information from a participant using a predetermined, standardised interview schedule, but, where the participant's answers are unclear, the researcher is encouraged to elucidate the ambiguity with freeform enquiry (Brugha et al., 1999). SSIs were chosen as the predominant method of data collection because of their flexible nature which allows the researcher to explore a subject in a conversational style that meets the needs of each participant and explore aspects unique to each individual in an in-depth manner (Kajornboon, 2005). Within the current study, FGDs are principally used as a method of data triangulation. Triangulation is broadly defined as the combination of methodologies in the investigation of a specific phenomenon (Fielding & Schreier, 2001). The complementarity model of triangulation was used in the present study (Kelle, 2005; see 2.5). The complementarity model describes a method of getting a broader and more complete picture of the studied phenomenon (Barnes & Vidgen, 2006). Within the present study, this allowed me to develop an understanding of how emotions and their associated regulatory behaviours function across knowledge-producing contexts of SSIs and FGDs. Data triangulation is argued to strengthen and verify data and conclusions, by either evidencing or refuting findings across measures, thereby making research more robust (Patton, 1990).

SSIs and FGDs were chosen as a method of data collection as, although ER includes non-conscious aspects, conscious aspects of the emotional and regulatory experience are salient and important (Gross, 1999). SSIs and FGDs follow a format that can provide insights into an individual's regulatory behaviours and goals (Gross et al., 2006). Using a semi-structured format for both SSIs and FGDs also allows participants to describe their subjective experiences in their own words whilst allowing for an approximate standardisation of data across participants. Ethical approval was provided by Keele University's Ethical Review Panel (ref: ERP2317; see Appendix A for letter of approval).

3.2.2 Participants

Recommendations for the number of focus groups, semi-structured interviews, and sample size vary within the literature (Fern, 1982; Kitzinger, 1995; Kreuger, 2014). It has been argued that both too few and too many interviews and focus groups can lower the quality of qualitative research (Sandelowski, 1995). This has been suggested to occur due to an inverse relationship with quantity of transcribed material, and external constraints (e.g., time) which impact the analyst's ability to extract depth and richness from the data (Carlsen & Glenton, 2011). There is evidence, however, to suggest that within interview formats subject to thematic analysis between 15-20 participants allows for the occurrence of thematic saturation and code stability in the data (Guest et al., 2006) and a minimum of three focus groups comprised of 5-8 members to identify key themes within the data (Krueger, 2014). I used these guidelines in the present study while recognising that judgements about data saturation and stopping rules cannot be determined wholly in advance of analysis (Braun & Clarke, 2021).

Forty-one participants were recruited for this study (55% female, 42% male, 3% non-binary; M_{age}=24.66 years, SD=6.04 years, range=18-46 years) via opportunity sampling from either the community at Keele University or from the general public through poster and social media advertisements. Participants self-selected whether they participated in a semi-structured interview (SSI) or focus group discussion (FGD). Undergraduate students received partial course credit for participating; members of the general public received no incentives for participation. The single inclusion criterion was that of English monolingualism. This criterion was chosen as language use, especially that of impolite language, is subject to cultural variation and subsequently may mediate associated emotional experiences (Culpeper et al., 2014). Based on this criterion, four participants who participated in SSIs were excluded from the interview phase and were thus not included in the analysis after disclosure that they were bilingual. One SSI participant was excluded due to the overuse of leading questions on part of the interviewer and one SSI participant was excluded due to problematic behaviours during the interview session. Therefore, a total of 35 participants were included in the current study investigating the role of expressive speech as an ER strategy in everyday life.

Seventeen participants' (80% female, 20% male, 0% non-binary; M_{age}=20.5 years, SD=2.44, range=18-27 years) semi-structured interview data was analysed. Within the interview sample, participant ethnic group composition was 70% White British, 15% Indian, 5% Black African, 5% Arab, and 5% mixed White and Asian. Focus group data from 18 participants (67% female, 28% male, 6% non-binary; M_{age}=29.78 years, SD=4.67 years, range=24-46 years) was analysed (FGD1 N=7; FGD 2 N=6; FGD 3 N=5). Within the focus group sample, participant ethnic group composition was 100% White British (see table 3.1 below for participant demographics).

Table 3.1

Participant demographics for Study One

ID	Gender	Age	Ethnicity	Condition
#3942	Female	27	White British	SSI
#2760	Female	20	Black British	SSI
#8159	Male	22	White British	SSI
#4852	Female	19	British Indian	SSI
#8742	Female	20	British Indian	SSI
#6730	Female	19	White British	SSI
#5334	Male	26	White British	SSI
#7813	Female	18	White British	SSI
#8405	Female	19	White British	SSI
#6162	Female	19	White British	SSI
#5009	Female	19	White and Asian	SSI
#4138	Female	18	British Indian	SSI
#8865	Female	18	White British	SSI
#7317	Female	20	British Arab	SSI
#8477	Female	21	White British	SSI
#5718	Male	20	White British	SSI
#3286	Male	20	White British	SSI
#1825	Female	31	White British	FGD1
#3366	Female	29	White British	FGD1
#6855	Male	29	White British	FGD1
#4999	Male	30	White British	FGD1
#3757	Male	30	White British	FGD1
#1567	Male	29	White British	FGD1
#5728	Male	29	White British	FGD1
#3081	Non-binary	27	White British	FGD2
#6455	Male	24	White British	FGD2

#7959	Female	31	White British	FGD2
#9374	Male	25	White British	FGD2
#3954	Male	30	White British	FGD2
#2609	Male	24	White British	FGD2
#7920	Male	31	White British	FGD3
#8011	Male	31	White British	FGD3
#9756	Female	46	White British	FGD3
#6554	Male	29	White British	FGD3
#7172	Female	31	White British	FGD3

Note. For reference later in the chapter, participants will be referred to by (a) their semi-structured interview (SSI) or focus group discussion (FGD) number notation and (b) their ID number. For example, as SSI #3286.

3.2.3 Materials

An interview schedule comprised of predetermined questions was developed prior to SSIs and FGDs based on the aims of this research, for example, "what does the phrase 'everyday emotional experience' mean to you?" (see Appendix B and C for SSI and FGD interview schedules). The questions focused on three core topics: emotion experiences and perceptions; speech and language; and how speech intersects with emotion experiences. These questions resulted from my own mind-mapping session where I wanted to formulate purposely broad questions, followed by some specific prompts, as I wanted to explore the what, how and why of everyday speech-based ER. The questions were open-ended and chosen to fit a 'funnel' sequencing over three categories: emotions, speech, and speech-based ER. A funnel sequencing method involves starting each set of questions broadly (e.g., 'Can you think back to a recent time which made you feel positive and tell me about it?') and narrowing down to specific elements (e.g., 'What specifically about [speech behaviour] was/was not helpful in the situation you just described?'; (Tengler & Jablin, 1983). These questions were collaboratively reviewed and refined by myself and the supervisory team.

Thus, participants were asked the same series of open-ended questions, and follow up questions were tailored to the individual participant or focus group to clarify and expand upon discussion topics revealed to be of key interest to either the researcher or interviewee(s). The schedule was loosely followed and the discussion occasionally digressed based on the identification of key areas of interest. Through the interview guide, within the SSIs and FGDs, participants were asked to describe: their perceptions, assumptions, opinions, and experiences about emotions; self-identified speech behaviours which are elicited by specific emotions; and the contexts which give rise to and moderate the emotion regulatory efficacy of said speech behaviours. Interview schedule questions were pretested on volunteer postgraduate research students within the university, no changes were made to the schedule as a result of this testing.

3.2.4 Procedure

To recruit participants, posters were placed around Keele University campus and posted on social media. Some slots were advertised on the School of Psychology research participation (RPT) scheme and through the University Students' Union volunteering scheme. While the RPT scheme was used to recruit participants, I aimed to recruit a sample from a wide educational and demographic background; thus only 13 participants (31.70% of the total sample) were psychology undergraduate students. After expressing interest, participants were emailed the information sheet (see Appendix D) in advance of the SSI/FGD so they could make an informed decision about participating. A reminder was emailed to participants on the morning of their SSI or FGD.

After arriving, participants gave their informed consent before the study began and were offered the opportunity to rescind consent once the SSI or FGD was completed. Participants were advised that they could leave the session at any point without giving a reason up until leaving the room as there would be no guarantee of accurately identifying each individual once anonymised. Both SSIs and FGDs were conducted in person in a private space (e.g., conference room) on Keele University Campus. SSIs and FGDs were audiotaped using a Dictaphone set up in the middle of the table, and digital recordings were transcribed verbatim to ensure systematic analysis of the data. SSIs ran for approximately 55 minutes (mean time = 52.5 minutes) and I conducted all interviews. FGDs ran for approximately one hour (mean time = 58.0 minutes) and were facilitated by myself in the role of moderator. At the end of the SSIs and FGDs, participants had the chance to ask questions or add final comments, then the Dictaphone was turned off and participants were verbally debriefed. Participants were also reminded of the researcher's contact details for any follow-up correspondence. Audio recordings of the SSIs and FGDs were transcribed by myself. I analysed the data using QSR NVivo. All participants were assigned a randomly computer-generated, individual, four-digit research ID number. These numbers were kept separate from personally identifiable information.

3.2.5 Data Analysis

Thematic analysis was used as an analytical method to identify, analyse, and report trends and patterns across the data set(Braun & Clarke, 2006). This flexible analysis is accessible, simple, and not aligned to any one theoretical or epistemological framework, and can generate complex and nuanced analyses (V. Clarke & Braun, 2013). Following Braun and Clarke (2006), the data were initially subject to inductive thematic analysis. This analysis followed six steps: (1) data familiarisation; (2) generating initial codes and coding the entire dataset; (3) collating codes; (4) examining codes to identify themes across the data; (5) reviewing and refining themes; and (6) defining and naming the themes. I conducted all steps, and the supervisory team were involved at steps five onwards to ensure that the themes represented a credible analysis of the data (Shenton, 2004). There were no disagreements in the identification of themes between myself and the supervisory team.

The data – with all demographic or personally identifiable information redacted – was read numerous times to ensure analyst immersion; notes regarding potentially interesting themes or elements of the data were made at this stage (see Appendix F for an example of my notes). Following familiarisation, I coded the entire data set. Codes were derived from the data in a bottom-up, inductive process; codes reflected either descriptive elements in the data set or analyst driven, theoretically informed ideas related to the data (Braun & Clarke, 2006). I used inferences from both a basic emotion (Ekman, 1990) and the TCE (Barrett, 2017b) approach to analyse the data. The research process was therefore an iterative and reflexive procedure. It is acknowledged that while I intended to produce a wholly inductive analysis, some deductive elements were inevitable given that the interview schedules, research questions, and epistemology of the thesis were developed *a priori*. As previously discussed (see 3.3.2), in the rare cases where I reflected on my practice and felt that I was leading participants using my own understandings, this content was excluded from analysis.

After initial coding, I grouped these codes into broad groups. Some codes were easily grouped together, such as "setting and context dictate which regulation strategies are employed" and "regulation strategies are learnt through socialisation during development" under the grouping of 'emotion regulation'. Those that did not fit into any category were classified as 'miscellaneous'. Once grouped, codes were reviewed again within the context of common groupings, from which I identified and grouped codes into themes and sub-themes. This top-down approach was necessary as it was essential to gain early knowledge of themes and specific speech-based emotion regulatory behaviours to design the subsequent quantitative studies. The themes and sub-themes were discussed with the supervisory team through comments during the drafting process.

Within the analysis, frequency counts are, at times, reported. Descriptors of frequency, however, are used in a broad sense to generally denote rate of recurrence. The term *majority* signifies that almost all participants reported or described the theme; *frequently* indicates that the theme was depicted by more than half of participants; and *some* refers to the theme being expressed by less than half the participants. Quotes have been selected to illustrate themes. Within quotes, '…' indicates text has been removed for concision and text within brackets has been inserted for clarity.

3.3 Results

The main themes and subthemes are presented in Table 3.2. In brief, the themes describe

Table 3.2

Main themes and subthemes identified from the semi-structured interviews and focus groups

Main Theme	Subtheme
Emotions Outside of Speech	Core-Components of Emotion
	Positive and negative, high and low intensity
	Story about Who I Am
	You Can Learn That
Speech Gives Emotion Form	Storytelling the Context and Components
	Words Let Me Understand and Express It
Speech Regulates Emotion	It's Not Just Speaking Out Loud
	People Just Want To Know That Somebody's Listening
	Talking Doesn't Change Reality
	Pressure Valves

the way participants understand or experience emotion and speech-based ER processes in their everyday lives.

The themes are discussed below with direct quotes used to illustrate each theme and subtheme.

3.3.1 Theme 1: Emotions Outside of Speech

Mirroring the empirical literature, each participant had their own understanding of emotion. Emotions were sometimes defined in relation to subjective internal experience, often used synonymously with 'feeling': "it's kind of like sort of the way you feel" (SSI

#4183), and "I suppose it's just a feeling" (SSI #5009). Emotions could also be defined using science as a framework of understanding, as exemplified by one participant: "you could start with: 'well emotion is a chemical reaction in the brain in response to external and internal stimuli'. Something like that, you know?" (SSI #5334). In this quote, the participant understands emotions as a neural response to stimuli. The observed diversity demonstrates that there is no one true statement or phraseology through which multidimensional emotional events can be comprehensibly described. There were, however, some aspects of emotion that had consensus across participants. These aspects are discussed below as the following sub-themes: Core Components of Emotion; Positive and negative, high and low intensity; Story about Who I Am; and You Can Learn That. The evidence constructed within this theme provides the basis from which emotion generation, experience, and regulation can be understood and operationalised in daily life and within scientific enquiry.

3.3.1.1 Core Components of Emotion

In essence, emotions were universally described as having three core elements. Firstly, emotions were denoted as being contextually bound. As one participant said: "I think it's how you feel and how you react to things that happen to you. Things that happen around you, like in your environment" (SSI #5718), and another noted: "emotions don't happen. So, it's how you process situations around you. And how your brain reacts to certain situations and how that makes you feel" (SSI #3942). These quotes exemplify the universal understanding that emotions are dependent on the situational context and that emotion elicitation is enacted based on appraisal processes related to the context.

Secondly, emotions were regarded as being time-limited, as described by a participant: "an emotion can be used to describe, like, things happening at different times. So, like, you could say that you were feeling sad yesterday" (SSI #4138). This participant seems to be saying that emotions are descriptors of one's subjective feelings at specific time points, such as *yesterday,* but that, as the time points are distinct (e.g., yesterday is separate from today), the emotional experience is time-limited.

Thirdly, emotions were characterised by changes to physiological, behavioural and experiential functioning. Two participants described this as the following: (1) “I think there are clear kind of hallmarks of happiness and when you're in a good mood, positive features such as smiling” (SSI #3286), and (2)

> “that’s the thing with a lot of these things, you do know that with stress especially you can really feel it physically on your body. Like, you know, like your heart’s beating and you’re just like worried” (FGD1 #1825).

In these quotes participants describe behavioural (smiling), physiological (increased heart rate), and subjective experiential (good mood, worry) indices of emotions as occurring during an emotional experience. Participants are expressing a lay belief that irrespective of internal or external factors, affective events require the presence of at least one of these three elements to be represented as an emotional experience.

These three core components of emotion were frequently described as being an omnipresent facet of consciousness: “I don't think we ever have periods where we don't have emotions. It's just when they're not necessarily apparent even to ourselves” (SSI #3286). Emotions were felt not dependent upon one’s awareness of them and once attention was purposefully guided towards emotion experience the individual would be able to identify and express information related to their emotional state. For instance, as one participant put it:

> “at any point you could ask someone: ‘how you feeling?’ And they'd have an answer. It's not as though they have to conjure up a feeling. Like: ‘oh okay hang on, let me turn on my emotions and then we'll see how that's going’. It's always readily available. You just have to point at it” (SSI #5334).

3.3.1.2 Positive and negative, high and low intensity

When discussing the experiential feelings of emotions, participants frequently identified two dimensions: hedonic valence (i.e., good to bad) and intensity (i.e., high energy to low energy). The dimension of hedonism was explicitly defined as occurring on a bipolar axis of positive-negative: “it's a subjective feeling that can be either positive or negative” (SSI #3286) and “[an emotion is] either negative or positive or it's kind of neutral” (SSI #4852). With regards to intensity, participants reported being able to experience increased magnitudes of an emotion: “within each emotion you’ve got like another mini spectrum. So like levels of happiness. Like, just like every day pleasantly happy. And then, I don’t know, birthday party happy” (SSI #4138). Another participant thought that:

> “for me, using the PH scale … I’d go pale blue as a: ‘oh, I’m pleasantly happy about that’ going up to [purple] ‘oh my God, I’ve won a brand-new car!’ or ‘I’ve won the lottery!’” (SSI #5718).

The described increases of intensity in emotion, such as these, reflect the importance of intensity in understanding the eliciting context, and the associated appraisals, of emotions. Both quotes situate the understanding of emotion intensity within the eliciting stimulus (e.g., winning a car or having a birthday party). In these examples, participants use linear metaphors, relating to scales or bipolar dimensions, to describe emotional experiences.

Participants used physical spatial metaphors, such as linear or circular instruments, to understand the abstract, conceptual space of emotion: “I think of it like a spectrum with the different emotions and like it’s like happiness merges into joy, and joy merges into excitement and all this” (SSI #4138), and

> “I think anxiousness is all the way up here [uses palm horizontally to indicate high level next to head] and nervous is more like in between. Nervous is more like, you’re just nervous and then the worse it gets the more anxious you become’” (SSI #2760).

When considering how to describe this spectrum, several participants described it as a circle: “if anything it could be more like a circle. Like if you keep going one way you eventually end up back at where you started again” (SSI #8159). When taken as a whole, this sub-theme provides evidence of how individuals construct and describe dimensions of emotionality. In these descriptions, participants seem to understand emotion as a circular space comprised of a small number of dimensions, which differ based on the valence and intensity of the emotion.

Unlike the other participants, one participant reported experiencing emotions as categorical entities which are separate in function and tone. She relied on external influences to express and describe the dimensions of emotion space, namely relying on emojis available on her mobile phone to describe emotionality: “You know the emojis? [Emotions] all express different emojis. (Laughs) Like the red face is the angry one” (SSI #8742). This participant reported a series of traumatic recent events in which they felt unable to express their emotions:

> “So, then, because I’ve been strong for my family all these years, I feel like I don’t like- I’m used to that. That’s what I know. So, I like to keep [emotions] hidden” (SSI #8742)

The same participant described emotional blunting in response to ongoing racially motivated bullying: “I don’t really have many emotions towards it. I mean I’ll laugh about it [publicly]. But then I don’t really have any emotions towards it” (SSI #8742). It may be likely that due to the high levels of emotional distress experienced by this participant that they rely on familiar and concrete external cues to make sense of internal signals, as they are unable to do so themselves at will. This was an unusual finding within the data. Such a finding may, however, suggest that where emotion dysfunction occurs, in this example emotional blunting and suppression, both the personal experience and wider conceptualisations of emotion may become difficult to access and express. It is beyond the scope of the present thesis to discuss this further. In general, it seems that emotions are understood by these participants to occur on intersecting dimensions that correspond to the theoretical axes of valence and intensity.

3.3.1.3 Story about Who I Am

When broadening the scope beyond the core components and dimensions, emotions were frequently described as being a vital aspect of an individual’s life story: “To give an abstract answer [emotion is] sort of like an integral part of who you are. The kinds of emotions that you get over a long period of time make up an aspect or a layer of who you are as a person" (SSI #5334), and "it's like a story of what you've been through" (FGD3 #6554). It seems that the emotions people have can provide otherwise unknowable information about the individual's state and trait disposition; a story that is continuously shaped across development as lived experience is accrued. Such understandings and beliefs about the self, in turn, propagate patterns of emotional experiences, which cyclically add to the story of oneself. Emotions acting as an integral aspect of personhood was frequently described as being informed by prior learning and experience, idiosyncratic to each individual:

> "your emotional response to something is very much dependent on your past history. And so, you know your brain, your memory, your subconscious, and all the other things that I don't really know about that make up how you are you. … So, you've got this very strange, very interconnected network of things which make up you. An emotion, something that makes something more emotional than something else, or an event more emotional than another event or whatever. Is dependent on those things, and how the event fits in to your overall world view. As informed by who you are which is informed by all those other things" (SSI #5334)

Thus, while the individual may not necessarily have conscious control of emotion elicitation, the systems through which appraisal and emotion generation occur are assumed to be directly influenced by an unknowable amalgamation of individual differences and idiosyncrasies. The impact of these individual differences was identified by some participants to provide insight into and continually add to the construction of a person's Story About Who I Am, that is the story from which they create ideas of the self. In line with this suggestion, several participants noted that while they believed there is some commonality in the emotions which are available to be experienced in daily life, individual differences - such as developmental disorders - could moderate the range or type of emotions experienced in daily life:

> “I feel like everyone has some sort of scale [of emotions]. And I think everyone is on the scale. But I feel like you are predisposed dependent on your personality and inheritance or if you have like a condition like autism and you feel more or less of the scale” (SSI #5178).

Emotions and the associated expressions were therefore seen as an important aspect of understanding otherwise unknowable information about the self or others.

Not only can emotions and the associated behaviours provide information about the self, but regulation of the emotion can also allow the individual to move towards, or define themselves as, their ideal self. There was a universal belief, expressed by all participants, that emotions were pliable and generally controllable, except for some high energy emotions (see subtheme Positive and Negative, Higher Energy and Low Energy). For example, in an anecdote where the participant who had lost their railcard did not feel believed by an older train conductor, the participant indicated that their anger was regulated through emotion suppression because they did not believe it was acceptable to display aggression towards older people:

> “I feel like I did feel angry but he was like. He was really old so like I'm not gonna shout at you … He looks old so I'm just like: "oh I'm not going to argue with him". Like. It just looks bad. And everyone was just looking at me and I was just like: "oh I'll just pay". And I apologised! But like it didn't actually do anything.” (SSI #6162).

The participant further reported that if the train conductor was of a similar age to the participant, they would not have regulated their emotion nor the associated behaviours. This regulation of anger was undertaken despite the participant believing that expressing, rather than suppressing, the anger would have been beneficial at a subjective, experiential level: “If I shouted I would feel a lot better” (SSI #6162). In this anecdote, the participant felt social pressure to regulate their emotions and associated behaviours to agree with cultural norms relating to age-appropriate behaviours between younger and older interaction partners. Regulation was enacted, despite the conflict between their appraisal of the situation and their hedonic emotion regulatory goals, to meet the cultural norms and enact behaviours that align with an idealised self. Emotion generation and regulation, therefore, may not only provide information passively about individuals but are used in a goal-orientated fashion to actively and continuously generate a story about the self.

3.3.1.4 You Can Learn That

Emotion categories were described as being learnt through social and cultural conditioning, foremostly directly through language:

> "when you think about anger, you will conceptualise it in a particular way. And that conceptualisation has been inherited by you being a fully-fledged participant in the language that you've been initiated" (SSI #5334).

This participant described emotions being learnt implicitly. Such implicit learning was thought to manifest beyond conscious awareness: "but you kind of watch other people and then [emotions] come out of you" (SSI #6730). Emotions and their associated behaviours were generally assumed to be absorbed, assimilated, and then enacted from one person to another.

There was also a belief that emotion categories can be taught explicitly through external intervention, as noted by one participant:

> "Well I see it from the other side because I help children learn to understand their emotions and you- a child who can't express their emotions or understand their feelings, there's lots of ways just talking about it or the little games you play or the sorts of questions you ask after an incident to help them understand the emotions behind it … that's all to do learning your emotions and how to on a basic level saying how you feel. … you can teach that. It's a slow process but you can learn that" (FGD3 #9756).

In this quote, the participant is making a distinction between knowing one's reflex responses relating to the internal emotion signal, knowing how to identify patterns of emotion data, and associating these with behaviours and expressions. The interpretation of affective data may in turn lead to patterns of behaviours where the individual has learnt that enacting *X* behaviour will likely lead to *Y* outcomes. Learning of outcomes can similarly occur implicitly, for example through understanding statistical regularities of outcomes, or explicitly through direct intervention. As emotion generation and regulation are assumed to be parallel, interacting processes, it was assumed by some participants that regulation can be learnt in the same way as emotion generation.

Within the data, it was not only the categorisation of emotion experience that was described as having the capacity to be learnt. The manner through which emotions are expressed, regulated, and communicated were universally believed to be taught by one's culture and society. Many participants described how, by having socially agreed upon expressive behaviours related to specific emotions, other members of the society could gain an understanding of the individual's future behaviours and intentions: "I think you're almost socialised to have emotions manifested, so that people have a very clear way of understanding your intentions." (SSI #3286). One participant suggested that societally dictated expression provided value judgements on behaviour, which in turn promoted behaviours and outcomes which were advantageous for the community:

> "whether [the emotion is] a good or bad thing to do is a - I think - a social construct. Because first of all it's society saying: "no that's not an appropriate way for us to live in society to express your emotion in that way"." (SSI #8159).

This participant expressed an understanding that by having socially agreed behaviours related to emotion experience, the social group can benefit from propagated positive behaviours and the ability to simulate and predict another person's future actions. This aligns with the suggestion provided in the subtheme Story about Who I Am, where emotion regulatory and expressive behaviours are flexibly enacted to align with one's goal state, as influenced by social norms and beliefs. By casting value judgements about what is appropriate and inappropriate emotional behaviour, participants identified that society at large can make easy deductions about who each individual is.

Whilst the constraining of potential emotionally expressive behaviours may have positive outcomes for the social group as a whole, it was suggested that such constraints can be detrimental to single members within a community. In the White, Educated, Industrialised, Rich and Democratic (WEIRD) society from which this sample was recruited, it was generally believed that males were constrained in the manner and degree to which emotions could be outwardly expressed or regulated. For example, in a focus group containing opposite gendered siblings, a humorous interaction occurred concerning the brother being unlikely to cry as an expression of sadness:

> "#1825: I know being a girl I kind of wear my emotions. Like you know. I'm quite happy to cry and stuff like that. Whereas a lot of men – not all men – but a lot of men that I've met, you know, wouldn't do that. Like, just look at my brother #3366. (#3366 laughs) You wouldn't do that. Like. (Laughs) You know?
>
> #3366: I might watch Mighty Joe Young Now. (Group laughs) I might cry my heart out. (Group laughs)" (FGD1)

The humour in this interaction is predicated on the fact that by undertaking regulatory behaviours which are expressive, a violation of social norms occurs; specifically, in this instance, violating the norm that male presenting individuals should not express emotionality publicly. While this interaction appears friendly within the group, it highlights a disparity between the genders in what is acceptable in terms of emotion expression and regulation. It also serves to perpetuate the social norm through derision of an emotionally expressive behaviour. Later in this focus group, participants discussed how there were actual negative social consequences for males to ignore social norms and regulate their emotions through crying:

> "Society has decided how we should like share emotions. In the same way, you might not associate men with crying, you wouldn't associate women with going out and fighting. Whereas men would. And I think that's a sort of societal projection from being very young. … Like it's unacceptable for a man to cry publicly. Or to release their emotions in that way … If they had a fight. Two idiots fighting. It'd be

> alright. But if we had a cry, it'd be like… 'Oh look at them two weirdos'" (FGD1 #4999).

While in the above exemplars of constraints on emotion expression were discussed with humour, generally these restrictions were seen as having damaging effects:

> "I think this is one of the few ways in which your kind of gender assignment and socialisation does affect you. As a male we are typified as not being very externally projective with our emotions. … I'm very conscious of speaking to people about my emotions and coming across as too soft. ... I think for me personally, I do try and bottle things up. Because I don't want to come across as weak and whiney." (SSI #3286).

As in this example, there was a belief in the data that for men one's self-worth and identity may be harmed if one's behaviours do not fulfil the ideals and norms associated with emotions; and that it was more desirable to experience emotional distress than to violate what it means to hold specific roles in society. These gendered displays of emotion indicate that forms of emotion expression and regulation are learnt through social conditioning and modelled behaviours from individuals with a similar identity to one's own.

When taken in sum, the information outlined in the current subtheme suggests that as emotion experiences occur through – what appear to be understood by participants – parallel processes of emotion generation and regulation (see 3.3.1.1), emotion experienced as a single unit is impacted by passively and actively learnt behaviours and patterns. Such learning is experienced as occurring implicitly and actively through social interaction, and is thus assumed to be impacted by social norms and roles. It is therefore likely that emotion generative and regulatory process implementation and efficacy may differ and be crudely differentiable quantifiably across members of social groups, such as across the genders.

3.3.2 Theme 2: Speech Gives Emotions Form

Previously, under Theme One, participants outlined a belief that emotions constitute a key aspect of one's identity (see subtheme 'Story About Who I Am' and 'You Can Learn That'), and the present theme extends this idea – holding the following as a truism: where emotion experience governs the content, speech provides the form for understanding one's emotions and the psychologically relevant eliciting events.

3.3.2.1 Storytelling the Context and Components

When asked to provide an example of a recent, everyday emotional event, the examples provided by participants generally followed the proceeding format: orientation; event; and evaluation. These features may occur as a natural feature of storytelling (Labov & Waletzky, 1997). I also feel that these features may suggest that the pre-emotional situation is assumed to be represented by a state of neutrality or normality; a representation that is established or implied through the orientation period. For example:

> "The first thing that springs to mind is literally a few minutes ago when I was downstairs … I was walking in *(Orientation)*
>
> and I bumped into two people that I live with who, despite getting back on Sunday, like all of us haven't seen each other. … And then I walked into the building and bumped into two of my friends … *(Event)*
>
> It was quite nice. It was quite happy. *(Evaluation)*" (SSI #4138)

Within each example, the event is related to a psychologically relevant incident. In each anecdote, participants set the context for the eliciting event. The inclusion of context may provide insight into how the elicited emotion may not be divorced or removed from the given situation or context.

Subsequently, the evaluation is when the individual appraises both the incident and the emotional reaction. Appraisals may involve explicitly naming emotions, such as in the above quote, or may instead describe physiological or expressive components related to an emotion, for example:

> "My boyfriend gave me a ring! (Laughs) … It's not an engagement ring. It's a promise ring. But still. Same thing. (Laughs) *(Orientation & Event)*
>
> But, like, he was like. He was supposed to give it me on our anniversary, but he just could not wait. He was just like: 'can I just give it to you now?' And I was like: 'I feel like I know what it is! You keep saying I want to give it to you now!' So, he was like. He just got it out. *(Event)*
>
> And I was like: (deep intake of breath). My heart was just beating so fast it was ridiculous. *(Evaluation)*" (SSI #8405)

In this quote, the evaluation is not explicitly judged through specifying an emotion. Instead, the participant communicates information about the expressive behavioural response (the gasp) and the physiological response (increased heart rate) to provide information about the emotional experience. It is not clear whether differences in core component description, that is differences in either naming emotions or describing emotion qualia, correspond to individual differences relating to the experience or understanding of emotion. It is reasonable to suggest, however, that the difference in narrative structures may reflect the highly abstract and complex nature of emotion experiences. Indeed, the variety of linguistic structures available may signify how emotions are experienced as salient and multifaceted psychological events in daily life.

3.3.2.2 Words Let Me Understand and Express It

Language was described as the most important method through which emotions could be learnt, understood, and conveyed. Language was noted by several participants as allowing for the attribution of meaning to approximately grouped internal phenomena and providing a means of social consensus for understanding such groupings. As one participant put it:

> "Alright, so say you had a feeling, right? And you felt. Um. One day you felt angry, right? Just to you, you said I'm going to denote that feeling as. You know. 'X'. And then the next day you felt, as far as you're aware, angry again. So: "oh yeah, there's 'X'!" Right? But because there's no way for you to check the correctness or incorrectness of that. It doesn't really have any meaning. Because whilst it might have seemed to you that you were feeling angry. It could have been something ever so slightly different. The emotion or the feeling or the phenomena could have changed slightly. Unbeknownst to you. So that meaning isn't grounded in anything static. And so in order for language to really work there needs to be an agreed upon consensus." (SSI #5334).

This quote suggests that language provides two key mechanisms in emotion experiences. Firstly, the linguistic markers allow the individual to make sense of their subjective state where direct comparisons to prior similar events or changes to experiential functioning are impossible. Secondly, the linguistic markers are socially agreed upon as part of language and allows individuals to express otherwise incomprehensible and complex information about their subjective state in an easy and accessible manner across interaction partners.

There was also a belief expressed by some participants that by increasing one's emotional vocabulary, one's emotional range would also broaden. For example, one participant commented:

> "before I knew that word [schadenfreude] and what it meant – maybe not the word before someone had described it as an emotion, I would never have gone: 'actually I get that sometimes'. And now that I have had that emotion, regardless of the word, but the feeling. I can understand it and express it" (FGD1 #3757).

By increasing the diversity or richness of markers available with which to group the internal signal which comprises first-order emotion experiences (see subtheme 3.3.1.1), participants suggested that emotions could be differentiated with greater skill and same-valenced emotions could be conceptually distinguished and communicated with ease. There seemed to be a belief that individuals with a greater emotional vocabulary were able to flexibly identify and experience a greater range of emotions than individuals with a limited emotion vocabulary. Thus, rather than simply providing an insight into the internal workings of an individual, language was frequently seen as an active process which could both restrict and extend emotionality, as described by one participant: “I think in some ways we are liberated and some ways we are constrained [with expressing emotion through language]” (SSI #8477).

Using language as a mechanism to understand and express emotion was, however, described as being a fallible system. Linguistic referents rely heavily on other cues, such as context, to provide insight into the valence and arousal of an emotion (see subtheme Positive and Negative, Low Energy and High Energy). For instance, in a singular category of emotion (e.g., fear), there can be a multitude of eliciting events or associated effects with the potential to occur within that categorical boundary. One participant stated that:

> “there’s definitely more than one type of fear. But I think it’s just one word. But there’s different types of fear. There could be, you know, you’re on a theme ride and you’re all the way at the top and you’re scared to come down. I think that’s fear. And then you’ve got one fear, that you’re scared of exams. Or a fear of spiders. They’re all different types of fear” (SSI #2760).

It appears that emotions were seen to inherently contain variability within and across emotion category boundaries and that contextual cues and situational demands dictate the nature of an emotion.

3.3.3 Theme 3: Speech as Emotion Regulation.

It was a generally held belief that engaging in speech-based behaviours – referred to as talking in the interviews – provides the speaker with relief from negative emotions: “I feel like when I do talk it helps.” (SSI #7813). Participants tended to use simplistic metaphors to explain how talking ‘helps’, with ‘helping’ predicated with a firm belief that speech is implicitly healing or restorative. This belief did not only occur in the abstract but one participant, after sharing details of a recent negative emotional event with the interviewer, reported experiencing a positive change in emotion experience at that time during the interview: “[talking about it now is] making me feel a lot better actually” (SSI #6162). Several participants also conversely reported that not talking about an emotionally negative event may cause further distress or psychological harm: “if you don't address it and you just feel it and you don't do anything with it, and you just leave it in a box. It just stays there festering” (SSI #5334). The idea that, by not talking about one’s emotions, the negative feeling could continue and potentially increase was frequently discussed by participants. Thus, by talking about one’s emotions, there was a universal belief that the individual was able to experience some degree of relief from the negative internal event.

The directional mechanism through which regulation occurs due to specific speech behaviour use appeared to be not easily accessible to the individual. Most participants tended to conflate down- and up-regulatory processes and relied on generalisations or simplifications to explain the emotion regulatory process, such as: “I always feel better when I say it out loud.” (SSI #8405). In this quote, the participant was able to identify a change in the trajectory of a negative emotion because of speech behaviours but did not provide details of the mechanisms or systems which lead to this change.

Thus, when considering the directional nature of regulation, it appears unclear whether participants believed that, in most instances of emotionality, speech (a) singularly down-regulates the active negative emotion; (b) up-regulates separate positive emotions; or (c) simultaneously down-regulates negative emotion and up-regulates positive emotion. Despite this, the belief in speech as a regulatory behaviour was evident in the data. The role speech plays as an emotion regulatory mechanism is explored in the following sub-themes: It’s Not Just Speaking Out Loud; People Just Want to Know Somebody’s Listening; Talking Doesn’t Change External Reality; and Pressure Valves.

3.3.3.1 It’s Not Just Speaking Out Loud

The majority of participants reported that, through speech, an individual can elicit changes to their own subjective, internal reality; changes that can provide long-lasting remediation of negative emotions. Regulation appears to be granted through the transition between two consecutive, linear processes: externalisation and processing. These will be discussed in turn below, followed by a discussion of how regulation interacts with the aforementioned process to meet the individual's regulatory goals. For clarity, where the participant is referring to the person speaking and the processes or phenomena available to that individual, the term 'actor' is used. Correspondingly, where the participant is referring to the audience or individual being spoken to, the term 'partner' is used.

Externalisation.

The first phase is externalisation. Before this point, emotions were assumed to be abstract and subjective events available only to the actor (see subtheme Story about Who I Am and Core Components of Emotion). Through speech, it seems that the emotions are appraised to become external to the self and therefore tangible. For example: "It's not only you hearing it in your head but you're saying it out loud so it makes it more real" (SSI #7813). In this quote, the participant identifies a difference between their internal subjective reality and the external objective reality which exists beyond the self. It appears that externalisation was deemed to place the emotion into objective reality.

It is of note that the externalisation of emotion was described as a distinct shift, in a way that complements and extends the findings from the previous theme 'Speech Gives emotions Form', as described by one participant: "with speech it's making it external rather than internal, it's sort of putting it out there. So it's sort of outside of you" (SSI #8477). It seems that the shift does not occur outside of the actor's awareness, rather a noticeable qualitative change occurs within the actor's subjective experience when the emotion is externalised. While the emotion remains abstract and subjective, due to the placement into an intersubjective reality it is now identified as a physical item, such as described by a participant in the following quote: "it feels like more concrete that I've spoke it" (SSI #8405). Where previously the emotion was unfalsifiable and potentially in flux, once externalised it takes form. In this quote, the participant describes the emotion as becoming 'concrete'. Concrete items can be experienced through sensation or perception (e.g., cats, books, etc.) and can be manipulated by multiple agents. For example, following externalisation participants reported that other people can take the emotion as if it is a concrete entity: "it sort of feels more like they're taking it from you" (SSI #8477) and then the partner can change the emotion and/or the eliciting stressor, as stated by two other participants: (1) "[the emotion is relieved because] someone else has to deal with this shit!" (FGD2 #3081) and (2) "you [talk] to someone so that they can sort of fix [your emotions] for you" (FGD2 #6455). It appears that emotions are understood to be modifiable following externalisation. Thus, externalisation transforms the internal event into an external object which is experienced as physical and which can be influenced and changed purposefully. The progression from external object to regulated event is facilitated in the next phase of processing.

Processing.

The formation of an intersubjective reality via speech provides an interface through which the emotions and appraisals can be accessed, attended to, and interacted with by a plurality of individuals (e.g., "you [talk] to someone so that they can sort of fix [your emotions] for you" [FGD2 #6455]). This interface describes the second phase: processing: "[saying it out loud allows you] to sort of deal with it and process that" (SSI #3942). Processing allows participants to engage with the intersubjective reality, and to assess regulation strategy implementation opportunities in line with individual goals (see Chapter 1). By being able to express and attend to the emotion eliciting event and consequent qualia, it seems that individuals are better able to access cognitive regulatory mechanisms which were previously unavailable and thus had rendered the actor unable to meet their own needs. From participants' accounts, there were no clear or specific regulatory mechanisms (e.g., reappraisal) that were privileged during this phase over the others. Rather, participants reported using a variety of strategies depending on the affordances of the situation, the context-specific details of the eliciting event, and their own goals.

While the strategies which could be used were numerous, implementation would likely be facilitated by increased attention to the externalised emotion. Indeed, externalisation was suggested to allow the agent to attend to the stimulus: "the fact that you're saying it means you're paying attention to it" (SSI #5334). While ER can be effortless, occurring outside of conscious awareness, in cases where regulation may require support from another individual – as speech-based regulation often does (see subtheme People Just Want To Know Somebody's Listening) – awareness is required for change inducing action to be taken. Thus, the shift from interiority to externality may facilitate attendance to the concrete, external stimulus which in turn allows access to, and the implementation of, goal-orientated regulatory strategies via processing.

Regulation.

In terms of whether the facilitated regulation was adaptive or maladaptive, it seems that while these two phases of externalisation and processing must occur linearly for regulation to be achieved, participants did not assume that regulation would automatically occur in all instances. This section will discuss how participants understood regulation to occur either maladaptively or adaptively.

Maladaptive Regulation. Participants identified that following processing, using speech was an active process that can allow regulatory strategies to be implemented. Where this regulation was maladaptive, it was suggested to be due to a lack of access to cognitive regulatory strategies, for example, one participant stated:

> "There's a difference between talking through it and just talking about it. So if you're just talking about how you feel like: 'this is making me angry' or 'this is making me sad' or 'this has happened, why would they do that?' You'll just start to think more things in your head. Instead of thinking 'okay this has happened and this is frustrating, they shouldn't have done this but at the end of the day it's happened. There's nothing you can do to change it'. I think it's the way you speak to yourself. Or the way you say it that can change the way you actually feel. Not just speaking out loud." (SSI #7813).

As demonstrated in this quote, simply externalising one's emotions or appraisals does not appear to be sufficient to induce regulation. Without engaging actively with the processing phase, or in situations where regulation strategies remain inaccessible (for example, when the stressor is ongoing [see subtheme Doesn't Change External Reality]), the actor will not be able to influence their emotional state. Similarly, where regulation does not occur, it seems that passive engagement following processing can lead to maladaptive up-regulation of emotion contrary to those required to meet regulatory goals, one participant thought: "If I'm going over old ground and nothing new is cropping up, I just get agitated that nothing has changed" (SSI #3286). In this quote, the participant describes the potential for maladaptive up-regulation of negative emotion in situations where regulatory strategies were not implemented via the processing interface. Thus, it seems that regulation is appraised to be an active process that builds upon externalisation and processing, rather than a simple by-product on the two-phase linear process.

As processing is the mechanism that allows regulation to occur, without skill or knowledge of how to use this mechanism, regulation may be incomplete or maladaptive. For example: "I'm like a recorder and I'm just pressing play … I feel like: 'why? Why do I need to repeat myself?" Why can't you just get it the first time?'" (SSI #6162). In this quote the participant outlines that regulation does not always occur following externalisation and processing, noting that they lacked the insight into why regulation did not occur. Where participants described having limited insight into why regulation did not occur in these cases, they often used a metaphor of an automated machine stuck in a loop to describe the maladaptive method. Talking about this one participant described: "You're stuck. Feedback loop" (SSI #5334). The feedback loop metaphor may suggest that, like the groove on a vinyl record, each repetition allows the emotion and appraisals to become deeper and more substantial. It may be harder for the individual to get out of the loop as each cycle makes the emotion qualia more concrete within the intersubjective reality and harder to change.

Adaptive Regulation. Following processing, speech was identified as having the capacity to induce adaptive, long-lasting changes to an individual's emotional state. For example, in an anecdote where the participant expressed her emotions concerning a difficult colleague through speech with close others, they felt an enduring shift to their emotional state and future states throughout the day:

> "I think it helps me to be able to tolerate her for the rest of the day. Cos like, when you're doing an 8 or 9-hour shift with someone that, like, that does your head in. It is quite hard. So, I think once we've- once I've got it out my system, I can just chill then and get on with the rest of my day" (SSI #5718).

Where adaptive regulation occurs – as indicated in the quotes in the Processing sub-theme where participants allude to several cognitive regulation strategies, including acceptance and problem solving – individuals can implement a multitude of regulatory strategies in parallel following processing. Thus, speech appears to provide a channel through which the individual can begin the process of adaptive regulation.

3.3.3.2 People Just Want to Know That Somebody's Listening

Participants described wanting to be heard: "people just want to know that somebody's listening" (SSI #3286). By being listened to, participants described feeling acknowledged and validated; with validation seeming to be the key ingredient to ensure regulatory success. For participants who did not feel that validation would occur, they reported that they were unlikely to use speech as an ER mechanism. For example:

> "I don't even speak about my emotions. [Interviewer: Why not?] I just find it really hard to. Cos I just feel like the other person will never fully understand so it's kind of like pointless at times" (SSI #6162)

Similarly, if the partner does not respond in a way that allows the actor to feel as if their experience is being acknowledged, their emotional state may change contrary to what is desired in line with their regulatory goals. One participant said:

> "If I spoke to someone and I was really excited about something and then they acted disinterested, then I would probably feel like: 'why? Why?' I don't know. I would

> probably slow down and be less excited about it because they're obviously not appreciating what I'm saying" (SSI #8865).

In this quote, the participant describes a potential situation where not being acknowledged may lead to an undesired outcome. In scenarios where the partner is not able to express understanding for the expressed emotion, in this example for excitement, the participant describes feeling less positive and attributes this change in emotional tone to the lack of validation. Thus, it seems that if the actor believes that they will not be heard or fully understood, and therefore unlikely to feel validated, speech is appraised as being ineffective in regulating emotions. As such, it seems that for speech to be an effective regulatory mechanism in daily life, the actor must feel heard and validated during speech use.

The experience of validation during speech-based ER was described as being critical for improving the actor's emotional state, such as in the following anecdote where the partner unambiguously validates the actor's position. Talking about this, one participant stated:

> "I think everyone's got that one mate who they can text, and I'm thinking of someone particular in my home town (laughs), where you can text and be like: 'aww this person's done this and this' and they're like: 'What a bitch! Oh my God! That's terrible! You are totally in the right! Love ya babes! Love you!' And it's amazing! And I am just like: 'I am so validated right now! Thank you!'" (FGD2 #3081)

In this example, the participant describes seeking out a specific partner ("I think everyone's got that one mate who they can text") who they believe will hear what is being said and who will accept their point of view. The partner acknowledges the eliciting stressor and subsequent emotional reaction ("what a bitch!" and "that's terrible!"). Such acknowledgement suggests that the partner understands what is being expressed and that they understand how the event has impacted the actor. The partner is then described as agreeing with the actor's position ("you are totally in the right!"); through agreeing, the partner seems to believe the actor's version of events, and they corroborate and support the appraisals and potential subsequent actions of the actor. The actor then describes statements of affirming the relationship ("Love ya babes!"), which I understand as further supporting the actor and their appraisals of the event. The partner's statements of support seem to allow the actor to feel validated ("I am so validated right now"), which seems to induce a change in the actor's emotional state ("and it's amazing!"). Overall, it seems that validation is achieved through providing positive feedback that either comforts, supports or acknowledges the decisions, feelings, concerns, or judgments made by the actor.

Within the data, it was clear, as in the previous quote where the actor was explicitly validated by the partner, that the partner was carefully selected based on several attributes relating to the individual and the eliciting context ("I think everyone's got that one mate who they can text" FGD2 #3081). Furthermore, participants outlined that there is no one specific individual who will fulfil the specific regulatory needs of the actor in all circumstances. For example, in the following quote, the participant states that the regulatory nature of speech is dependent upon who the actor speaks to: "[Interviewer: does talking to someone change the way you feel?] Well it depends who you talk to I suppose, doesn't it?" (SSI #5334). Participants described choosing a partner based on the assumption that the specific individual will understand, and thus validate, the topics discussed. Appraisals of levels of potential understanding were based on two components: similarity, referring to the level of similarity in lived experience between themselves and the partner; and closeness, referring to how emotionally close they felt to the individual.

When choosing a partner based on similarity, participants described preferring to disclose emotional appraisals and experiences to individuals who share a frame of reference, for example: "if it was a rant about a specific, a really specific thing then I'd rant to someone about it who was involved. Also, who was in my position" (SSI #5009). In this quote, the participant identifies that they would prefer to rant (vent) to someone who was associated with the eliciting stressor or who has had comparable experience in a similar position. By having a similar experience, participants seemed to believe that the partner would better be able to understand and validate their experience. This belief was particularly salient when participants discussed stressors associated with specific contexts, such as the workplace: “if somebody pisses you off at work, it’s better to vent to someone who works with you” (FGD2 #2609). Thus, there seems to be a belief within the data that soliciting support for a partner with prior personal knowledge of the context of the stressor is essential to effective ER.

Similarity may not solely refer to having similar experiences, such as in the same work setting. It can also extend to having perceived similarities in personality, personal values, and backgrounds. For example, one participant described their belief that seeking out a specific partner with dissimilar worldviews may lead to detrimental shared outcomes, as described by a participant:

> “when you’re polar opposites and you’re just kind of getting annoyed at each other for not getting each other’s points of view on the situation, then it can just be unhelpful and lead to arguments … talking about it with someone who believes the complete opposite isn’t going to be helpful and just leads to you getting upset with each other” (SSI #4138).

In this anecdote, the participant suggests that if the actor and partner have *polar opposite* world views, the dyad would be unable to fully understand each other’s points of view; which would, in turn, lead to increased levels of negative emotion and discordance in the social relationship. These are outcomes that I assume are highly unlikely to be in line with either individual’s ER goals. It seems that there are many ways in which a partner may be similar to the actor, and that these dimensions are integral in appraisals of understanding and validation for speech-based ER.

When choosing a partner based on closeness, participants described choosing partners who shared a close, multifaceted relationship with the actor. One participant described soliciting support from people within the core social *circle*: “[You rant to] the ones in your circle” (SSI #3942). Within the dataset, participants identified that the individuals within this core social circle were family members, *best* friends, and romantic partners: “[I’d talk to] my best friend, I'd feel like: ‘yeah, you're my best friend. Obviously I'm going to tell you stuff’" (SSI #6162), “like my family, we’re very close so I probably would tell them anything" (SSI #6730), and "I talk to my sister and my Mum, but I- Oh and [my boyfriend] (Laughs) But like not- I talk to them. But no one else" (SSI #8405). It seems that participants assume that based solely on closeness the partner is likely to understand and validate the actor in almost all instances of speech-based ER.

In summary, participants identified that the social aspect of speech-based ER was key in ensuring regulatory efficacy. Specifically, my understanding is that the actor requires validation from the social partner to effectively regulate their emotions in many instances of using speech-based ER strategies. It seems that participants believed that attributes of the social relationships, largely pertaining to closeness and similarity, govern the extent to which the actor can feel understood and validated, which in turn controls subsequent regulatory efficacy.

3.3.3.3 Talking Doesn't Change Reality

While speech was universally described as being an effective mechanism through which ER can occur, some situational factors were believed to determine speech-based regulation success. Where the eliciting stressor is ongoing and continues to re-elicit emotions, it seems that speech was understood as being unable to provide long-standing regulation to the associated emotions. The lack of regulatory capacity in these instances was attributed to the understanding that speech cannot change the reality of the situation or induce change on the stressor which re-elicits the emotion: "[talking] doesn't change the circumstance. It doesn't change the reality. So it's a short term solution" (SSI #3286). In this quote, the participant identifies that speech is not the most appropriate strategy to be implemented to change the stressor and meet their regulatory goals (see Subtheme It's Not Just Speaking Out Loud for discussion on speech and reality). Similarly, in these situations, speech was seen as a temporary solution which does not necessarily address or resolve the underlying cause: "It's like a plaster, isn't it? It's not going to solve the problem. Not until you've internally resolved the issue" (FGD1 #6455). In scenarios where speech does not alter the eliciting event, it seems that participants believe that speech is not necessarily the most appropriate regulatory strategy. This is exemplified in the following quote, where the main door into the participant’s accommodation was broken and would not close, leaving the occupants feeling vulnerable and unsafe. The participant reported that talking about the event did not reduce the emotions felt as the eliciting event – the broken door – was not remediated:

> “But the actual situation, the door not closing. Like I was worried inside. And I think everyone was worried inside. But I don't think talking about it made us feel even slightly better about it or anything. … Some people knew about it, not everyone. Like we didn't know everyone in the block. Some people knew about it so we kind of thought to ourselves: ‘oh maybe they'll shut the door when they leave’. Um or like: ‘when they see it's kind of open, then they'll probably shut it.’ Um. So yeah. I don't think I felt better” (SSI #4852).

In this quote, the participant described using speech to socially share their negative emotions and appraisals about the situation but acknowledged that this did not induce change to their subjective emotional experience. I feel that as there were ongoing concerns, such as a lack of control over who could access the accommodation, which speech could not remediate, it was ineffective in this situation. These examples are noteworthy as it suggests that speech is a dynamic emotion regulatory process; a process which, like all regulatory techniques, cannot be effectively applied to all situations. In sum, it is widely understood that speech may therefore not be an appropriate regulatory mechanism in all instances of an emotion.

3.3.3.4 Pressure Valves

Speech was described as being used to reduce the intensity of highly arousing emotions (see subtheme ‘Positive and negative, high and low intensity’): “It’s like a pressure valve … it just takes some of the pressure off. It relieves the intensity of the emotion” (FGD2 #3081), and “it sort of like diffuses the burning … But that’s what anger is for me. Like that burning” (SSI #5718). The suggestion that speech can diffuse a dangerous and uncontrollable experience such as ‘burning’ indicates that it may fulfil protective and regulatory mechanisms. In the present study, participants identified two behaviours that can act as a pressure valve: swearing and venting. In their descriptions, participants appeared to understand these two behaviours as distinct. However, as will be discussed below, participants indicated that the underlying mechanism(s) as to how either behaviour may regulate emotion may overlap. This may suggest that both behaviours may fulfil similar functions. Swearing and venting were pervasive and popular behaviours, both reportedly used by over 90% of participants. When discussing these concepts, at times, the word ‘ranting’ was used synonymously by participants when discussing venting; these quotes have been included in the present thesis unaltered.

I had expected that the negative emotions would solely motivate swearing and venting as an emotional pressure valve, but the data shows that the eliciting emotions were not constrained by hedonic valence. That is, the intensity of both positively and negatively valenced emotions were reported to be reduced through speech. The expectation that swearing was associated with specific emotions was not unique to me. In the below quote, the participant develops and redefines their understanding of swearing and the motivating emotions in response to the question ‘what emotions motivate swearing?’ While the participant initially posits that swearing is associated with a wide range of emotions, they exclude sadness as a potential eliciting emotion. However, they redefine this idea after reflecting on and explaining swearword use:

> “Any … If I’m happy, I swear. If I’m sad, I sometimes swear. Probably less so if I’m sad. No, no. I swear a lot when I’m sad too … Or if I get great news, I’m like: ‘Fuck yes, that’s amazing!’ So, it’s not like just negative ones. Like positive swearing too” (SSI #3942).

I interpret that, for this participant, sadness may not have been associated with swearing because it is characterised by low arousal (see Chapter 1 for discussion). The other instances of eliciting emotions in this instance are exemplars of high arousal emotions. The participant renegotiates their understanding of swearing use to include sadness. The thought that arousal governs swearing use is contrary to my belief that hedonic valence controls whether an emotion motivates swearing or venting use. Irrespective of this difference, the differing expectations highlight implicit beliefs about swearing and venting which may not accurately reflect actual use. It seems that swearing and venting are used for both positive and negative emotions, as well as emotions with high and low arousal.

When asked the same question as above ('which emotions motivate swearing?'), as part of a long exchange individuals in Focus Group 2 agreed that many emotions can elicit swearing, but that the defining feature which governed elicitation was emotion intensity. As above, we see this negotiation to include a multitude of emotions, culminating in the group agreeing on the intensity of the emotion being the primary motivator for venting or swearing use.

"#3081: Pain. Joy. Anger. Disgust.

#9374: Every one.

#7959: Boredom.

…

#9374: More extreme feelings I think.

#6455: Yeah, anything that can be classed as an extreme feeling.

#3081: Yeah.

Interviewer: So, what do you mean by an extreme feeling?

#9374: Anger. Joy as opposed to happiness.

#7959: It's the strong versions of those feelings.

...

#2609: Yeah. Like the extremities of those feelings.

…

#6455: I think could happiness could as well, you know.

#9374: Yeah, cos you do have those moments where you're just so happy about something, you've found out about something, you're just so excited about something, you need to vent that to somebody." (FGD2)

The suggestion that the levels of excitement experienced could necessitate venting ('you need to vent that') indicates that it is the intensity of the emotion, rather than the hedonic valence or arousal, which stimulates venting use. The manner in which venting was necessitated due to the extreme nature of the experienced emotion was described by a participant as a primary factor underlying behaviour use. Another participant similarly described the feeling of needing to externalise the emotion as a reason for using venting: "[venting is] an extreme build-up of agitation that results in me kind of wanting to kind of externalise that irritation in some form" (SSI #3286). It thus appears that venting and swearing are enacted once the intensity of emotion becomes extreme or overwhelming.

In line with participants' understanding that venting and swearing are used in instances of extreme emotion, participants reported that they believed that speech can act as a pressure relief valve which allows for emotional catharsis to occur: "I'd say it's catharsis really. The shouting and everything like that. And the swearing" (SSI #8477). In my interpretation, catharsis refers to the idea that an individual can be liberated from built-up, harmful emotions by freeform verbal expression. This interpretation is bolstered by the suggestion that speech can release internal pressure within the individual, a process described as *letting off steam*:

"#7920: It's like a vent, isn't it? Like straight away, it helps.

…

#9756: Yeah, exactly! Let off a little bit of steam without really exploding." (FGD3)

Participants used the venting metaphor literally in this excerpt, describing feeling as if they were going to explode. Without venting, participants endorsed a belief that damaging or detrimental effects could occur. This view was echoed by another participant, who described how they would have negative physical and observable outcomes if intense anger was not vented:

> "#3081: For me it's quite physically immediate. Like, I get all that stuff with like clenching my fists, and like people can see it in my eyes and stuff.
>
> #6455: Is that the unresolved, unvented, un-everything-ed anger? That just builds up and builds up?
>
> #3081: Yeah. Like a little volcano. Waiting to explode." (FGD2)

Venting is understood to allow the systems to stabilise and return to an equilibrium, as indicated in the following quote where the participant believes that venting allows them to return to a state of calm:

> "It's just a venting thing … it's one of those ways of just letting it out so I can then calm and compose myself to then go back and deal with the situation" (SSI #8159).

The same effect was reported for swearing: "it makes me feel more calm" (FGD1 #3757). In congruence with the metaphor of venting pressurised systems to return to a stable state, participants described some situations where, through the use of swearing or venting, ER occurred. In the following example, participant #3757 describes experiencing high-intensity anxiety when watching their team play in a high-stakes Football Association Cup match, and the other participants expand upon this experience:

> "#3757: I think if I swear when I'm watching football because we score, it's kind of that anxiety of 'we needed to score then'.
>
> #1567: So, it's like a release of your anxiety then?
>
> #3757: Yeah.
>
> #5728: Yeah, I think it would make it better, yeah.
>
> Interviewer: It would make it better?

> #5728: It's like when you get home from work or whatever. And you might sit back and relax and go: '(sighs) thank god that shit's all done with' sort of like that" (FGD1)

In this example, participants describe a football-related scenario that elicits high levels of anxiety and of coming home after work. In these scenarios, swearing is used reflexively without conscious effort (i.e. implicit regulation) to down-regulate the negative emotion towards a hedonically neutral, low-arousal state; a state where relaxation and reductions in tension can actively be experienced. This state was not only described as a form of relaxation, as in the above quote but also as a way of 'feeling better'. The scenarios appear to not involve other people, which I interpret to suggest that swearwords may be used effectively to change one's emotional state alone and outside of a social setting. It is noted that participant #1567 asked a potentially leading question ('so, it's like a release of your anxiety then?') in response to participant #3757's anecdote relating swearing to anxiety. I do not think this is problematic for my analysis as the experience of down regulation was expanded further by participant #5728, and similar experiences are also evident in other participants' experiences of swearing. For example, in the following anecdote, a participant describes an interaction with a work colleague who is struggling with anger and stress:

> "He started ranting and swearing and stuff. And then he was like; 'oh sorry, I'm swearing.' And I was like: 'please, continue. You need to get this out because you know it's obviously not very good for you to keep it all in' … I see in him that he needs to swear and get the anger out, and I understand what that feels like. So I was like: '[swearing] is how I deal with this, you can deal with this the same way I do and I will happily be there for you to do that because I know that it makes me feel better' … I think it made him feel better. I had this discussion with him again this week because some other stuff happened and he was effing-and-blinding. And I was like: 'just swear it out! It's fine, man. Just swear it out'" (SSI #3942).

In this anecdote, swearing is described by the participant as an adaptive mechanism for managing and regulating anger. The participant identifies that they have lived experience of swearing improving their state emotion – it makes them *feel better* – and also that they understood swearing to have both the propensity to, and actual effect of, change the experienced anger of the work colleague. The participant references a belief that it is 'not very good' to keep the anger 'in', and they endorse the idea that the emotion requires venting to protect the individual from continued emotional distress or harm. In this anecdote, the participant describes being able to use swearing as a chosen, conscious process (i.e. explicit regulation) in response to negative state emotion and that they endorse this behaviour due to their belief that it is effective in changing the negative emotion. That is, they suggest using swearing as a goal-directed chosen behaviour to *feel better*. As in the previous anecdote, it seems that swearing will allow the individual to return to a low-arousal, neutral emotional state. Furthermore, as the work colleague re-used swearing in a later instance where the participant encouraged the colleague to continue swearing, I think that it is likely that the work colleague experienced positive effects of swearing. It seems improbable that the behaviour would be repeated if it did not yield some form of qualitative and positive change to the individual's subjective experience. Thus, it appears that swearing and venting are understood to down-regulate a variety of negative emotions, and this down-regulation is thought to continue for a period following venting.

As noted earlier, swearing and venting are also associated with positively valenced emotions. From my interpretation of the data, I believe that swearing and venting fulfil a different function for positively valenced emotions than that which is understood by participants to occur for negative emotions. Namely, it seems that venting and swearing may increase or up-regulate positive emotions: "I think [venting] heightens it … you're like: 'oh, I feel really good now!'" (FGD2 #3081). It may be that, like in venting relief systems, there are pressure reducing and pressure increasing valves. Where reduction systems return the system to a stable state, pressure increasing valves allow the system to approach the desired pressure for optimal or specific functioning. Thus, by 'heightening' the experienced emotion, the individual is increasing the level of emotional *pressure* to experience greater levels of positive emotion. In an anecdote where a participant describes venting their excitement with another person, they described being on a *high* in the period after venting: "Oh, I love [venting]. You get to be really excited … a while after that we'll just be on like a high" (SSI #8405). It seems that this participant feels that venting can provide an adaptive up-regulation of positive emotion which can last for a prolonged period. Hence, it seems that swearing and venting may up-regulate positive emotions and, similarly to the effect on negative emotions, that any changes can be enduring.

The function of the pressure valve system is described by participants to facilitate quick regulation, meaning that any changes to their emotional state are facilitated more quickly than if swearing or venting was not used. As in the previously described difference between the decreasing pressure and increasing pressure valve systems, this facilitation occurred differentially for positive and negative emotions; with the expedited process generally exclusively associated with changes to negative emotion. The following quote compares the difference in the temporal trajectory of anger and excitement in instances of venting and not venting:

> "[When not ranting, the anger] would have been a much slower dissipation. I like thinking of it like a graph … in the ranting condition we have a steep decline, almost straight down. And in the no rant condition it'll be a slow decline like a curve … [Interviewer: When you rant when you're angry, it dissipates the anger faster. What does it do to the excitement?] Oh, it will go up! [Interviewer: It will go up?] Yes. Opposite graph! I'll draw you a graph. So, this is time and excite. So, you're already at quite a level of excitement and you'll start ranting about how excited you are and it'll make it go like a sharp incline" (SSI #3942).

Participant #3942 described venting to change their subjective experience of anger and excitement. To illustrate their experience, the participant drew graphs to describe the difference in temporal trajectory (see Figure 3.1 below). For anger, venting was believed to allow down-regulation to occur at an expedited pace. That is, the participant reported that they believed they would reach an equilibrium irrespective of whether venting occurred or not, but that venting would ensure that the dissipation of anger would occur more quickly when venting was used. Similar understandings of venting and swearing were reported by other participants for negative emotionality. For example, one participant described knowing that the outcomes between venting and not-venting would ultimately be the same, but that they would use venting to reach their goal state more efficiently:

> “eventually I will calm down ... But I think it takes longer for me to do that and to calm down … [Venting helps] me calm down quicker. And move on with it” (SSI #8159).

In this anecdote, the participant reports that, in instances of negative emotionality, they know they will return to a state of calm in time irrespective of whether or not they vent, but that without venting this process would take longer to occur. The same effect was described for swearing: “[the anger] might go down eventually. But I feel like it takes less time if I swear” (SSI #8405). Thus, I feel that one of the ways venting promotes adaptive down-regulation is by decreasing the time taken to reach a calm and level state and expediting emotional recovery for negative events.

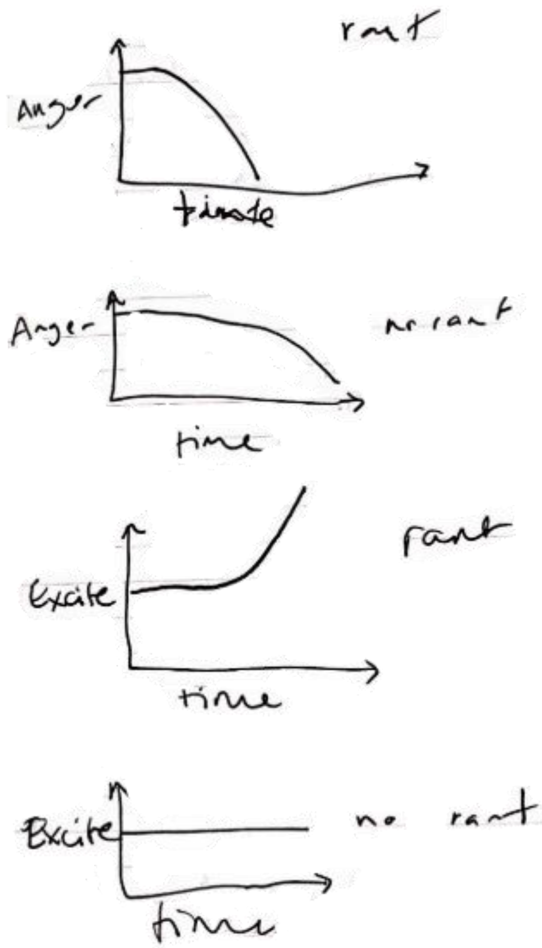


Figure 3.1. Graphs drawn by SSI participant #3942 to demonstrate the temporal trajectory of anger and excitement ("excite") in instances where venting occurs ("rant") and does not occur ("no rant").

The impact of venting and swearing for positive emotions, such as excitement, was slightly different. In the above graphs and anecdote, participant #3942 explained that in instances of not venting, the emotion would not change. Rather, as previously described, venting allows for the increased up-regulation of the positive emotion at will.

When considering how venting or swearing may change one's emotional state, participants were unable to describe or define how the pressure valves system worked: "I don’t know. It’s really gratifying. ‘Oh fuck.’ It’s really gratifying” (FGD3 #9756). Swearing and venting were behaviours described by participants as being qualitatively different in emotional tone than other speech behaviours; they are ‘gratifying’ and yield a pleasurable emotional experience. This emotional experience was largely ineffable: “I just feel like when I swear I can just let everything out. It just feels- Like I can't even describe it” (SSI #6162). The clear understanding that swearing and venting are qualitatively different from other forms of speech and the lack of insight into how any potential effect occurs as a process model may suggest that there are implicit underlying mechanisms that are yet to be fully explored.

3.4 Discussion

Contemporary scientific understandings of emotion and regulation within non-clinical samples have tended towards disregarding folk theories of emotion, suggesting that insight into affective processes is limited and overly influenced by popular culture (see Chapter 1). Despite this, lay individuals are the de facto experts of their own experiences and can provide nuanced and rich insights into the hierarchical, scientific realm of research (Code, 1991). Three themes were generated from the data and will now be synthesised with the wider literature.

3.4.1 Emotions Outside of Speech

The majority of participants were able to provide insights into how first-order instances of emotion and ER were experienced and used in daily life. The concept of an emotion was described as occurring on axes of positive-negative tone and high-low intensity. This lay understanding mirrors core affect accounts of emotion, underpinned by valence (feeling of good or bad) and arousal (lethargic or energised), and derived from neurophysiological signals, in literature informed by the Theory of Constructed Emotion (TCE; Barrett, 2017b). Furthermore, participants often related experiences of emotion that were incompatible with Basic Emotion Theory (Ekman, 1992). Rather a populations view of emotion categories was described. A populations view of emotions hypothesises that an instance of a given emotion category will occur as part of a variable distribution around a mean instance of an emotion, but that the mean instance is a statistical summary that does not exist in nature and variations allow for mixed or blurred boundaries between emotion instances (Barrett & Adolphs, 2021; Barrett & Westlin, 2021); that variation is the norm in terms of emotion experiences. This aligns with populations theories of emotion, such as the TCE, in that emotions are not understood by participants to be discrete states but rather occur as fuzzy and dynamic events. These findings highlight that, as understandings of emotionality are sophisticated and nuanced within the general population, researchers should use lay individual accounts and understandings of emotion to refine or reject theories of emotion, which in turn serves to improve scientific paradigms and research credibility.

Emotions were understood as providing implicit information about the individual; an emotion indicates one's stance in the world, one's concerns, goals, intentions to act, and identity. Participants felt that their emotion repertoire and available emotional behaviours were constrained not only by their regulatory goals but also by the language and culture they were immersed in and the social norms associated with their gender identity. By expanding one's language or eschewing social norms, it seems that participants felt they were better able to experience a wider range of emotions and emotional behaviours. This finding reflects patterns of emotional experiences and responses found in cross-cultural research (e.g., de Leersnyder et al., 2013; Kitayama et al., 2006), where the emotions available within any given context are constrained by cultural norms and the associated acceptable behaviours are informed by one's given identity within the social environment.

3.4.2 Speech Gives Emotion Form

Within this theme, participants described how, through speech, emotions could be understood. When discussing how emotions have been recently elicited, participants tended to describe in detail the contexts and associated factors which dictated emotion elicitation. While this may be a feature of storytelling itself, I suggest here that it also may demonstrate the importance of the affordances and qualifiers which give rise to an emotion; without explicit mention of these variables, an emotion may be difficult to understand or fully convey. Furthermore, when participants described emotion events, they relied on the use of the three core components of an emotion (see 3.3.1) to depict the event. This may suggest that participants have insight into and awareness of the key blocks of emotion experience, and their descriptive use demonstrating that none of the components are privileged over another when it comes to communicating and understanding emotion qualia.

Notably, participants described how language could be used to group instances of a given affective experience under a linguistic marker to express and understand their emotional state. This process was suggested to allow for the categorisation of emotion qualia, irrespective of whether the experience was the same as a previous experience within the same category; thus expediting communication and comprehension. According to Wittgenstein (1953), an individual can understand an experience using private and public language. Private language refers to immediate internal sensations, for which there are no grammars or coherent linguistic rules from which to extrapolate meaning. Within the sphere of affective science, private language may be understood as interoception or core affect. Public language refers to the agreed system of rules (e.g., syntax, grammar) between peoples from which information can be shared. For emotion, this may be understood as the affect labels assigned to each emotion category or population. In line with this assumption, Wittgenstein (1953) suggested that, as our own private language is unknowable by other people, it is impossible to know whether a given sensation is experienced similarly across people. However, public language allows for approximations using consistent and agreed upon referents that generalise across people who share the same socially agreed system of rules. Wittgenstein's philosophical approach could conceivably relate to participant accounts that appear to follow the same logic: that linguistic markers allow for communication of otherwise unknowable internal states.

Furthermore, when using public language to describe private language, Wittgenstein suggested that an individual overlooks the fact that, for the mere act of naming and describing to have coherence, there are swathes of previously learnt information that dictate language choice. That is, for coherence in the communication of emotion, the selected descriptors and labels rely on previously learnt situated concepts and experiences. This could not only apply to the specific linguistic referent itself but the associated contextual factors or affordances inherent in the eliciting situation. This position may reflect how there appeared to be variation in the features within and across emotion boundaries but the same word was used to describe the emotion event (e.g. fear describes the feeling of going on a rollercoaster and spiders). This finding may also link to the previous theme where participants endorsed a belief that emotions were learnt and consolidated across development (see 3.3.1.4), often through the learning of affect labels (e.g. *schadenfreude*). Through public speech, these emotion events are given form from which they may be communicated and best understood. Thus, the present theme builds upon the prior theme in exploring how individuals understand emotion and the eliciting contexts by using speech.

3.4.3 Speech Regulates Emotion

Participants universally described the belief that emotions could be regulated via speech. There seem to be two processes that underpin such regulation: intrapersonal externalisation and processing; and social regulation of emotion. Firstly, the intrapersonal process of externalising and processing allows the actor to shift the emotion – which previously only exists as a facet of their own conscious experience and is inaccessible by others – into an external, shared intersubjective reality. Once externalised, the emotion now given form helps the individual to process it and apply regulatory strategies to meet their individual goals. Secondly, the social regulation of emotion relates to the support provision available to the actor after speech-based ER. This converges with the literature which suggests that social regulation functions primarily through acceptance, which entails the partner validating the agent's expressed feelings and appraisals (Thoits, 2011), and through reappraisal, which entails the partner providing divergent appraisals for the eliciting event (Zaki & Williams, 2013). As speech-based ER was reported to often occur in social contexts, it is reasonable to expect that social features of the regulation context may be an important determinant of how speech is used to regulate emotion. In line with attachment theory (Shaver & Mikulincer, 2014), the present study found that when participants do not trust their interaction partner to respond appropriately to the instance of interpersonal ER, they were unlikely to undertake speech-based regulatory behaviours in social situations.

Similarly, where the partner responded inappropriately or in a manner contrary to expectations, speech-based ER was thought to be rendered ineffective or may elicit an undesired negative emotion. These findings are consistent with theoretical ER literature, in which there is a pivot towards focussing on the social contexts and determinants of ER

(English et al., 2017). These findings highlight that researchers need to consider the social contexts which govern speech-based ER use, and how the dynamics of different relationships are likely to yield different outcomes, for example, such as the levels of similarity or closeness between the actor and partner. Hence, this finding is used to inform the subsequent quantitative studies contained in the present thesis. As the dynamics of social relationships appear to play a pivotal role in the efficacy of any given regulatory strategy, to avoid potential confounds, the quantitative studies will standardise the procedure across all participants and opt not to include a social dimension to the paradigms.

Specific forms of speech, namely venting and swearing (see 2.5.4.3), were described as having the propensity to regulate highly arousing or high-intensity emotion. It seems that such regulation was thought to be able to occur irrespective of emotion valence. In my analysis, I likened venting and swearing to a venting relief system; a similar metaphor to that of the hydraulic model of catharsis (Breuer & Freud, 1893; Bushman, 2002). Venting relief systems are designed to control pressure within a closed system. Within such systems, if the pressure falls outside of acceptable levels – in terms of emotion, pressure relates to the intensity of emotion or arousal – damage may occur or the system may not work effectively. In these closed systems, where pressure increases beyond the pre-set safe level, to safeguard against damage, the system discharges fluid until the pressure drops to an acceptable level. For negative emotionality, this seems to be experienced as an overwhelming and urgent need to express the emotion. Participants understood this emotion event to be expressed and dissipated by venting or swearing.

Similarly, in actual pressurised systems, where pressure decreases beyond an optimum level, temperature/fluid levels are increased within the system until the pressure reaches a desirable level. For positive emotionality, participants report that this is experienced as a desire to further increase levels of emotion arousal which is achieved through venting and swearing. Of note, participants described believing that venting and swearing as having the propensity to regulate emotions at an expedited rate, as compared to not swearing or venting. This is a novel finding in the literature. Investigations into affective chronometry – the time dynamics of an emotion's trajectory (see Chapter 1) – are in their infancy, as such fundamental understandings of affective chronometry are unavailable (Davidson, 2015). However, this suggests that affective chronometry may be an integral aspect of the implementation process in that participants will use venting and swearing due to its expedited regulatory nature to regulate high-intensity emotions which require immediate regulation. This finding informs the subsequent quantitative studies contained in the present thesis, as it provides a rationale for the investigation of expedited ER strategies (i.e. venting and swearing). It also provides a methodological rationale for collecting emotion component data (e.g. psychophysiological indices) which unfold over time, as opposed to only collecting a singular snapshot (e.g. single questionnaire) of emotional state.

In the present study, participants reported that venting or swearing was enacted in response to high intensity or extreme emotions; an intensity that required immediate regulation to return to a more optimum emotional state. Within emotion systems, I suggest that pressure is likely to be experienced as an interoceptive signal with high motivational immediacy – as the consciously perceived aspect of core affect is presumed to be the abstracted layer of meaning from internal signal data (see 1.2.2.3) – meaning that change to the system is required to ensure maintenance of allostatic control. Allostasis is the process by which the brain maintains energy regulation in the body through predictive processing (Sterling, 2012), and is theorised to be instrumental to ER and retaining homeostasis (Barrett & Simmons, 2015). Through predictive processing, it is theorised that the brain constructs an internal model predicting future signals based on calculations of the differences between predictions and actual incoming signals as prediction error (Ohira, 2020).

Within this theoretical framework, interoceptive signals functionally update and alter internal models when there is a deviation between the predicted signal and the incoming signal. In such a deviation, experienced as intense emotion, ER strategies may be employed to move the body in the direction of a more optimum state by reducing physical energy levels (i.e. the intense emotion), thereby decreasing the prediction error and regulating state emotion. In terms of predictive processing, the value of potential options and the obtained outcome are continuously updated within mental models using prediction error signals (Ohira, 2020). If an option, such as swearing, is used and the obtained outcome to the interoceptive signal is better than the current value, swearing is then integrated into future models and reinforced learning occurs. This stochastic understanding of regulation strategy efficacy may underlie the beliefs in the present data that swearing and venting are adaptive regulatory strategies in response to emotion events. That is, swearing and venting have been previously experienced as adaptive in moderating interoceptive signals at an expedited rate, and so they are regularly used and commended as an effective strategy in daily life; such as in the excerpt where the participant endorses swearing use to regulate anger with their work colleague or in the wider analysis where participants endorse swearing as a means of *feeling better*. Future research could test this theory by assessing whether there are measurable variations in biological and psychological processes after speech-based regulation of *pressurised* emotions.

Participants described using venting and swearing in response to a multitude of elicited emotions and across varying situational contexts. These forms of speech-based ER were also described as being used reflexively with little conscious control, as in the excerpt of swearing while watching a football match, and used with effortful control, as in the exert of endorsing swearing with a work colleague. Returning to the metaphor of venting relief systems, to maintain control of the allostatic system, actual venting relief systems may be used as direct-acting or pilot operated, meaning they can work as an automatic function or as a selected, motivated process. From the findings of the present study it seems that speech-based ER, such as venting and swearing, are employed similarly; both regulating emotions as rapid, effortless processes with which the actor does not consciously enact the behaviour to meet their regulatory goals (i.e. implicit regulation) and as an effortful (i.e. explicit regulation; see Chapter 1 for discussion) mechanism which is applied specifically to meet the needs of the situation. These processes are differentially implemented dependent on the situational context (i.e. the situational affordances; see Chapter 1) and the regulatory goals of the individual. I theorise that – in line with current perspectives on ER (e.g., Sheppes, 2020) the ultimate aim of these behaviours is to return the individual to a more optimum emotional state, irrespective of whether that is a state of equilibrium or an increased state of positive emotionality. This is a deviation from prior research assessing venting associated ER which has tended to measure changes to negatively valenced state emotion, predominantly that of anger (e.g., Behfar et al., 2020; Parlamis, 2012; Tonnaer et al., 2020). Previous research has found conflicting results on the impact of venting of negative emotionality, with a reduction of anger (Tonnaer et al., 2020), no change to negative state emotion (Behfar et al., 2020), or an increase in anger (Parlamis, 2012).

3.4.5 Reflexivity

It is standard practice in qualitative research to continuously reflect on one's practice. As such, I have included my reflections on the analytical and writing processes for the present work. Before doing my PhD, I had limited knowledge of qualitative research and I found the idea of conducting a qualitative analysis daunting. Both my undergraduate and postgraduate courses had focussed on quantitative methods, a reflection of teaching in most higher education institutions where qualitative methods are often allocated little time or resources as part of the curriculum and are usually taught after quantitative methods when students have developed assumptions about the scientific value of psychological enquiry (Clarke & Braun, 2013). Graduate students often experience isolation, uncertainty, and struggle with methods when using qualitative approaches to conduct research (Hunt et al., 2009). I too often felt overwhelmed, alone, and struggled when I first started to engage with qualitative methods. In particular, I struggled to develop skill in identifying critical elements, with feelings of uncertainty with how to best analyse or manage the large dataset, and – consequently – with pacing, that is finding a reasonable pace at which to move through the various steps of thematic analysis. While I continued to have difficulties with identifying critical elements throughout the analysis, through interactions with my PhD cohort, supervisory team at Keele University and colleagues at the University of Oxford, I was supported through these issues in a safe environment which improved my confidence and skill. I believe that the development of a support network is crucial in overcoming obstacles and, on reflection, I wish I had sought out a mentor or network earlier in the analysis stage to ensure I was properly supported throughout.

Before data collection, I had a priori assumed that participants would describe and discuss emotion and regulatory qualia in line with discrete theories of emotion, namely that of basic emotion theory (Ekman, 1992); see Chapter 1 for discussion). Basic Emotion Theory (bet) posits that there are a small set of distinct emotions that differentially elicit specific measurable antecedents (see 1.2 for discussion; (Keltner, Tracy, et al., 2019). BET has been the prevalent theory of emotion for over 50 years. It is, arguably, salient in popular culture, as evidenced by the Disney Pixar film Inside Out (Docter et al., 2015). The production team of Inside Out consulted Ekman and Keltner, both being proponents of BET, to develop the story and ensure scientific integrity in the film. The submergence of scientific theory into lay beliefs, irrespective of the validity, authority, or authenticity of said theory, can lead to entrenched understandings in lay individuals (Cooter & Pumfrey, 1994). Where entrenched understandings persist, they are used as error-prone mechanisms and heuristics which are used to explain one's lived experience and which are supported through the social sharing of the theory (Blancke et al., 2017). I was surprised that, in the analysis, it was clear that participants did not provide accounts underpinned by discrete theories of emotion. Rather, participants described experiences and understandings more closely aligned with populations theories of emotion, such as the TCE (Barrett, 2017b). I found this particularly interesting as it demonstrated that lay individuals may have quite a sophisticated understanding of emotions and regulatory processes, but that their perspectives have largely been dismissed by empiricists. This highlights the value of conducting exploratory qualitative investigations before the onset of confirmatory quantitative studies, as future experiments can be designed so that they align with lived experiences of the general population rather than upon scientific assumptions.

3.4.6 Limitations

While this study provides an in-depth examination of lay individuals' experiences of emotion in daily life, it does have some limitations. Firstly, participants were generally able to discuss abstract concepts, such as regulation, in sophisticated terms or large amounts of detail. It is likely that there is a self-selection bias available in the present sample, where individuals who can understand and communicate information about emotion with high levels of granularity are more likely to participate in emotion and qualitative research. As such, the findings may not fully provide a complete understanding of how people understand emotions, regulation, and speech in daily life. Future research could examine people's understandings of these phenomena using a variety of modalities, including quantitative surveys, social media, or online focus groups. Through using a variety of data collection approaches, individuals who are less skilled in expressing complex ideas verbally may be able to contribute to the study in a way that better suits them, thus providing a more representative dataset regarding people's appraisals and opinions regarding emotions, regulation, and speech.

Secondly, the above limitation may be exacerbated by the presence of Alexithymia in participants. Alexithymia is a condition where individuals have a marked difficulty in identifying, naming, and distinguishing emotions (Goerlich, 2018; see 4.4.3.5). That is, individuals with Alexithymia would likely struggle to identify or talk about emotions. As discussed above, this may preclude participation in the study. Alternatively, this may mean that the data collected could contain insights from individuals who struggle with emotion processes and so any inferences made could not be fully representative of the perceptions and understandings of emotion in non-clinical groups. However, it may be argued that as Alexithymia in the general population is thought to be approximately 13% (Salminen et al., 1999) and there are few clinical interventions available to treat Alexithymia as a singular symptom (Samur et al., 2013), the inclusion of participants with Alexithymia would in fact allow for a full representation of the experiences of a wider sample of individuals who may self-identify as being part of a 'non-clinical' population. However, future work could actively screen participants for Alexithymia to assess whether and how presence of this condition may impact results.

Thirdly, it is noted at this juncture that any claims made in the following discussion must be understood to not necessarily generalise beyond the recruited sample (e.g. transferability, the ability to use the findings to a completely different group or setting) or beyond the present writer's interpretations (e.g. analytic generalisation, the agreement in distinguishing relevant or key aspects in the data;Polit & Beck, 2010), and future research should be carried out to assess the reliability of these claims. This may, for example, include a second or third researcher to analyse the data corpus to measure whether analytic generalisation occurs (Polit & Beck, 2010).

Fourthly, after the presentation of these findings at the Society of Affective Science's 2021 Annual Conference, colleagues raised the possibility that lay individuals' understandings of emotions may have been influenced by Barrett's media blitz about the TCE and her book publication which occurred at the same time as data collection (e.g., Barrett, 2017a; Robson, 2017; Spiegel et al., 2017). While no participants had formal education in emotion theory or the psychology of emotion beyond A-level, it is reasonable to suggest that the prevalence of the theory of constructed emotion across various forms of media in 2017 may have informed beliefs and understandings of emotion. However, such a confound may be a strength of the study. Interdisciplinary emotion research stresses the importance of situating understandings of emotions within the specific social, cultural, and temporal contexts from which the data is taken (Dixon, 2021). The data collected within the present work seems to be a credible reflection of lay beliefs within the present cultural and temporal context as there were no discrepancies between the descriptions given in the SSIs and FGDs. These two methods of data collection not only can be used to triangulate the results of one another but may give insight into how emotion experiences are similar or dissimilar across individuals from different demographic groups, such as age groups (SSI M_{age}=20.5 years, FGD M_{age}=29.78 years). While future research could aim to create a corpus of data at regular intervals and across cultural contexts to create a fuller understanding of emotion, I believe that the current dataset is a robust and rich corpus of information.

Finally, as discussed in 3.2.4, 31.70% of the total sample were undergraduate students studying psychology. Correspondingly, 68.30% of the sample were recruited from the wider general population. The present sample were recruited using convenience sampling; this is where a sample is drawn from a source which is conveniently accessible to the researcher and may not be representative of the population at large (Andrade, 2020). Where convenience samples are comprised of a homogenous group (e.g., undergraduate students), the external validity of results may be called into question (see 8.5 for further discussion). While it has been suggested that sample demographics may not impact results for domains which produce outcomes relatively unaffected by personal characteristics , such as perception, qualitative research and affective research are more likely to be(Goodwin & Friedman, 2006) impacted by participant level variables. However, Landers and Behrend (2015) suggest that homogenous or convenience samples (i.e., student samples) should not be immediately derided as inappropriate or lacking external validity, but instead the acceptance or rejection of results from such samples should be empirically or theoretically justified. As such, it is important to consider how or whether the present sample, characterised by 31.70% undergraduate students, may have impacted upon the qualitative results, particularly in relation to understanding and conceptualising emotion.

When considering the empirical justification for concern regarding the external validity of the present results, it is important to note that the majority – specifically 68.30% – of the sample were not sampled from undergraduate student populations. Given that there was no evidence of systemic or marked differences in emotion conceptualisation or use of speech-based emotion regulatory strategies between demographic groups in the results, it may be argued that the findings replicated across the undergraduate student and general population samples. As such, there is little empirical evidence that participant level variables (e.g., student status) impacted the results.

There may, however, be theoretical justification for considering the validity of the qualitative results from undergraduate student samples. According to socio-emotional perspectives of aging (Charles & Carstensen, 2010), developmental differences may result in changes in emotion regulation across the lifespan. Indeed, Urry and Gross (2010) propose that the available resources differ across developmental stages and so affect the selection and success of different emotion regulation strategies. Undergraduate students tend to be within the emerging adulthood phase of development. Emerging adulthood is conceptualised as the period of life between the late teens to mid-to-late 20s (Arnett, 2007), and is perceived as a period of emotional instability (Casey et al., 2011; Somerville et al., 2010) and changes in emotion expression (Galambos et al., 2006; Soto et al., 2011). Zimmermann and Iwanski (2014) suggested that these changes may reflect developmental changes in emotion regulation. However, a systematic review of 23 studies assessing age-based differences in ER strategy use concluded that without consideration of moderator variables (i.e., situational factors, ER goals), there is insufficient evidence for age-related differences in ER strategy use. These findings align with wider research investigating the predictors for regulation strategy implementation in everyday life (e.g., Wilms et al., 2020; see 1.3), which indicate that regulation strategies are functional, context dependent, and governed by individual-level goals. Doré and colleagues (2016) suggest that to best understand contingencies for ER success, single participant-level variables (e.g., student status) should not be examined in isolation, but instead the process should be explored holistically and situational factor must be considered when understanding ER adaptiveness. The present study collected a rich dataset that included prompts concerning situational, participant level, and wider goal-orientated factors. As previously discussed, there was no evidence of marked or systemic differences in ER strategy implementation or rationale between participants who were undergraduate students and those from the general population. Instead, goal orientation and context appeared to be more reliable indicators of regulation strategy implementation and efficacy – a finding which replicated the research outlined above. Thus, while the sample demographics may have influenced the results, and future research should endeavour to recruit a representative sample, I argue here that there is limited evidence for either empirical or theoretical concerns relating to the validity of the findings.

3.4.7 Implications for the Thesis

This finding informs the coming quantitative studies contained within the present thesis. Principally, the behaviours subject to empirical investigation have been selected from the analysis. Both venting and swearing – chosen due to the descriptions given of the effective and expedited regulatory nature of both speech behaviours for moderating high-intensity emotions. Furthermore, based on the analysis that ER strategies may influence positively and negatively valenced emotions differentially (e.g., effect of venting on excitement and anger; see 3.3.3.4), the present work will use an emotion measure that assesses state emotionality on both sides of the hedonic valence spectrum, rather than using measures which only assesses negative or positive emotion or which measures both emotions on a bipolar scale (see 4.4.3.1 for further discussion). Finally, the results provide further support for the epistemological and theoretical frameworks used (see Chapter Two) in the present thesis. As such, the results of the empirical studies will be approached from the lens of the TCE (Barrett, 2017b) and alternative explanations (i.e. BET based interpretations) will be outlined in the final Discussion chapter (Chapter Eight).

3.5.8 Conclusion and Next Steps

In conclusion, speech is understood and experienced to be an effective form of ER within non-clinical samples in the United Kingdom. Specific forms of speech-based ER, namely that of venting and swearing, were experienced as effective in modulating both positive and negative state emotion at an expedited pace. However, the efficacy of such speech is governed by the social context and affordances available within the given situation. The present study makes a unique contribution to the literature by specifically examining how emotion is understood, expressed, and regulated using speech in the daily life of the general population. I will use these findings in the present thesis to assess whether venting and swearing fulfil ER functions (Chapter Five and Seven). The next chapter describes the procedures and methods used in these empirical investigations.

Chapter Four: General Methods for Quantitative Research

The qualitative study has provided the foundations upon which further quantitative studies can be undertaken. From the qualitative analysis, two speech-based ER strategies were selected (venting; swearing) for empirical study. Participants described venting and swearing as having the propensity to relieve high-intensity emotions quickly and effectively, in a manner that is congruent with theories of emotion (e.g., Barrett, 2017b; Gross, 2015). These behaviours will be assessed using experimental methods. The present chapter is concerned with the methodology used for these quantitative studies.

The quantitative experiments reported in this thesis share a common structure. The structure is detailed here to reduce repetition elsewhere in this thesis. The following individual experiments have truncated methodology sections in which the specific deviations from the general method are noted and specific reliability statistics are presented for each material.

4.1 Participants

Human participants were recruited from within the United Kingdom (UK) and the Netherlands (NL). Potential UK-based participants were drawn from three sources: the Keele University School of Psychology Research participation (RPT) scheme, Keele University Students' Union (SU) Volunteering Scheme, or from social media advertisements posted on Twitter and Facebook. Participants recruited through the RPT scheme received partial course credit and those recruited through the SU volunteering scheme received approved hours of volunteering which could be used to achieve a volunteering award. UK-based participants recruited through social media advertisements were offered a £10 Amazon.co.uk Gift Voucher as an incentive for participation.

Potential participants based in the Netherlands were recruited from two sources: the Tilburg University Social and Behavioural Sciences Research Participation Scheme (RPS) and, for the online experiment, the online experiment participation platform Prolific (https://www.prolific.co). The RPS invites undergraduate students to participate in research in return for partial course credit. On Prolific, participants were paid approximately GBP10/hour pro-rata, with experiments taking an average of 15 minutes to complete.

4.1.1 Exclusion Criteria

Participants were excluded based on three criteria. Firstly, I excluded participants with current diagnoses of psychopathology. Existing diagnoses of psychopathology are characterised by variable emotional functioning which may not be indicative of everyday emotional experiences in non-clinical populations, such as increased reactivity to events (for review see Myin-Germeys et al., 2009), and may have been at a slightly more elevated risk of distress in response to perceived ostracism induced during gameplay. These individuals were excluded as recruitment of clinical populations – that is, individuals with current diagnoses of psychopathology – is beyond the scope of the current thesis which is exploring the effects of speech-based emotion regulation (ER) in non-clinical populations.

Secondly, as a reduction of HRV has been reported in several cardiological and noncardiological diseases (Malik, 1996), I excluded participants with diagnoses of myocardial infarction, diabetic neuropathy, myocardial dysfunction, thrombolysis, and tetraplegia. Thirdly, I excluded participants who were taking specific medical interventions to manage vagal (e.g., heart rate, immune system) activity as this may modify HRV (Malik, 1996). Thus, participants who were currently taking β-adrenergic blockade medication, antiarrhythmic medication, or scopolamine/hyoscine medication were excluded from participation.

4.2 Ethics

As the following studies recruited human participants, the research contained within this thesis was conducted in line with the ethical guidelines for research with human participants, as stipulated by the British Psychological Society (Oates et al., 2021). The research protocols used were also set following the principles of the Declaration of Helsinki (Williams, 2008). Ethical approval for the studies presented in this thesis was obtained from the Ethical Review Panel (ref: ERP3139; see Appendices G-I for letters of approval) at Keele University, UK, and the Internal Review Board (ref: EC-2018.85; see Appendix J for letter of approval) at Tilburg University, NL. Participants received both written and verbal information detailing the study, provided informed consent and were given the opportunity to ask any questions (Appendices K and M).

4.3 Procedure

Prior to each study, participants were provided with an information sheet and gave written informed consent (see Appendices L-M). Participants were informed that they could experience feelings common in their everyday life, that their participation was voluntary, and that they could withdraw at any point without giving a reason. After giving consent, participants began the study proper. Electrodes were placed on the thorax of the participant and electrocardiogram (ECG) recordings were taken throughout (see 4.4.2 for detail). Then they answered some questions about their gender, age, and ethnicity. Hereafter, participants played up to two games of Cyberball (see 4.4.1 for detail;Williams & Jarvis, 2006). Depending on the experimental condition, participants either played a game where they were included in gameplay or excluded from gameplay. As multiple participants completed the study simultaneously in separate cubicles or laboratory rooms, participants were instructed that they were playing against other players.

After each game of Cyberball, participants were presented with a fundamental needs questionnaire, which was followed by the Positive and Negative Affect Schedule – Extended (Watson & Clark, 1999). At the end of each experiment, participants were debriefed and thanked for their participation. The study hypotheses were concealed from participants until after data collection completion. As both psychobiological measures and self-report questionnaires are not subjective instruments, outcome assessors were not blinded.

4.3.1. Randomization to Condition Procedure

Allocation concealment is a research technique used to prevent selection bias by concealing the allocation sequence of participants, from both researcher and participant, until the moment of assignment (Kim & Shin, 2014). In a re-examination of meta-analyses, it was found that selection bias, caused by lack of adequate random sequence generation and allocation, can lead to overestimation of effect sizes of up to 51% (Kjaergard et al., 2001). Similarly, a lack of adequate allocation concealment can lead to an overestimation of effect sizes by up to 54% (Egger et al., 2003). It is, therefore, reasonable to undertake a systematic and meticulous allocation concealment and random sequence generation procedure to safeguard against potential bias.

Within the empirical studies, participants were randomly assigned to the intervention or control group, using a previously generated, continuous randomisation list, kept in a closed envelope by the primary researcher. The randomisation list was created using The Sealed Envelope (2017) blocked randomisation online tool. Group assignment was randomly allocated into either the intervention or control group with a 1:1 allocation using random block sizes of six and eight. The random block sizes of six and eight were used due to meta-analytical evidence that block sizes smaller than four are inadequate in being protective against allocation concealment subversion in single-blinded studies (Clark et al., 2016), such as those contained within the present thesis.

4.4 Materials

The experiments were designed and administered in Inquisit 5.0 (2016).

4.4.1 Cyberball

As discussed in 2.5.2, the emotion of social pain was selected as the emotion elicitation approach. Cyberball, a computerised ball-tossing game in which players are included or excluded from gameplay, was used as the emotion elicitation paradigm. Cyberball was presented to participants as a mental visualization game; participants were instructed to imagine playing a game of 'catch' with other people, and to envision the setting and other players as vividly as possible (Williams et al., 2000). After this, the participant input their name and the game 'connected' to other human players, at which point the participant saw two players with common male, Mark (left player), and female, Emma (right player), names (see Figure 4.1). These names were chosen as they are common names in both English and Dutch speaking countries (Campbell, 2018).

Each Cyberball game consisted of 50 ball tosses. Ball tosses consisted of three components: a baseline period (500ms), a ball toss animation (900ms), and the period during which the computer or participant decides who to throw the ball to. The Cyberball event begins at the onset of the baseline period and ends once the next recipient (i.e. the player to whom the ball is tossed) is selected. This was a varying period determined either by the computer (1000 to 5000ms) or the participant (undetermined period; Sleegers et al., 2017). Before each ball toss, there was a randomly varying period during which the computer or participant decided who to throw the ball to. An animation of the ball being tossed to the selected player followed this decision. Each ball toss was either to the participant, known as an inclusion event, or to a non-player character, known as an exclusion event. Ball tosses were randomly determined and could take place throughout the game, thereby ensuring that the participant would remain involved in the task for the duration of the Cyberball game.

Participants in the exclusion condition received 10% of all ball tosses (*n*=5). Participants in the inclusion condition received 34% of all ball tosses (*n*=17). Upon receiving the ball, the participant would use a mouse to click on the player's name, thereby tossing a ball to that player. After 50 ball tosses had been completed, participants would be presented with a screen thanking them for their game play and instructing them that questionnaires about their experience would follow.

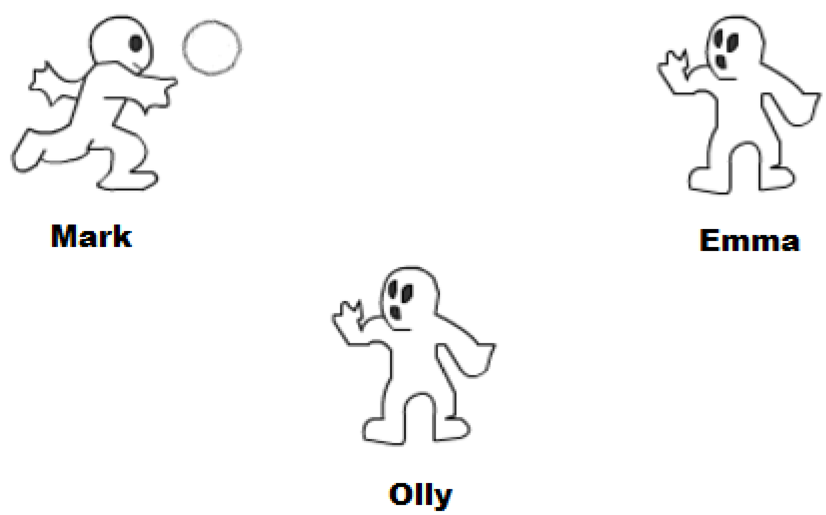


Figure 4.1. A depiction of the Cyberball game as presented to participants, where the participant's name is "Olly".

4.4.2 Heart Rate Variability

Heart rate variability was used as the index of psychobiological emotional responding (see 2.5.3).

4.4.2.1 HRV Data Acquisition Method

Electrocardiogram (ECG) recordings were conducted with BIOPAC MP36 4-channel research systems, using three leads. Disposable and adhesive silver-silver chloride (Ag-AgCl) pregelled surface electrodes were used to measure the voltage produced by subcutaneous tissue. Whilst classic limb electrode placement is based upon electrode attachment to arms and legs, the current study used an equivalent system based on electrode sites on the thorax. By placing electrodes on the thorax, electrode wires were shorter and thus less likely to be impacted by participant movement which can cause noise and artifacts within the data (Shaffer & Combatalade, 2013). The Right Arm (RA), Left Arm (LA), and Left Leg (LL) electrodes were placed on the thorax; RA electrode was placed under the right clavicle within rib cage frame, LA electrode was placed under the left clavicle within rib cage frame, and LL electrode was placed below the pectoral muscles lower edge, left of the rib cage. As recommended by Laborde and colleagues (Laborde et al., 2017), all measures were recorded with the participant sitting with knees at a 90° angle and both feet flat on the floor.

4.4.2.2 HRV Data Analysis

The recorded ECG data were analysed at the Psychobiology Laboratory at Keele University, using Acqknowledge and Artiifact (Kaufmann et al., 2011; Kremer & Mullins, 2016) software. The BIOPAC sampling frequency used was 1000Hz (Peltola, 2012). The raw ECG signal was visually inspected to detect artifacts (e.g. erroneous beats). A 1 Hz high-pass filter was used to remove noise and artefacts in the ECG signal. If artifact occurrence in a participant’s data was relatively small and infrequent, artifacts were corrected and edited using linear interpolation (Kamath & Fallen, 1995). Linear interpolation fits a straight line over the abnormal RR interval to obtain a new value. Despite the potential risk of misestimating IBI information, linear interpolation was chosen, over deletion of artifact, as interpolation maintains both the length and structural characteristics of the IBI series. Deleting the artifacts prevents the risk of incorrect IBI estimation but crops the data set; thereby leading to a reduction in data reliability (Kaufmann et al., 2011; Kremer & Mullins, 2016). If a participant’s raw ECG signal contained many or recurrent artifacts, the entire recorded data were excluded from analysis (Malik & Camm, 1990).

HRV data was measured using ultra-short and short-term measurement norm epochs (Shaffer & Ginsberg, 2017). Baseline HRV was measured in a 5-minutes resting epoch, and the effects of experimental conditions were measured in 5-minute epochs after the task ended. As the experimental tasks were speech tasks, HRV measures taken during tasks were not analysed. Changes to respiration, such as during speech, are known to induce variations to HRV signals which co-vary with the experimental task thereby leading to inflation of Type I/II errors (Quintana & Heathers, 2014). Such variations may be due to multiple factors, such as respiratory frequency or the amount of air taken into the lungs (Laborde et al., 2017). Indeed, Quintana and Heathers (2014) recommend avoiding HRV analysis from data collected during tasks that modify respiration.

HRV was assessed using both time and frequency domain analysis that quantify periodicities in the data. The norms for resting HRV are presented in table 4.1, and may be used as a reference point from which HRV data from the present thesis may be compared for normality. The Task Force (Malik, 1996) recommends using at least two HRV indices to triangulate findings and allow for causal inferences to be made.

Table 4.1. Descriptive statistics for absolute and natural log-transformed HRV indices collected over 5-minute baseline recordings from 44 studies with total *N*=21,438. (Table modified from Nunan et al., 2010.)

	Absolute Values				Log-transformed Values			
HRV Measure	Mean	SD	Median	Range	Mean	SD	Median	Range
rMSSD	42	15	42	19-75	3.49	0.26	3.26	3.26–3.41
HF ms	657	777	118	82-3630	4.76	1.78	4.96	0.08–6.9
LF:HF	2.8	2.6	2.1	1.1-11.6	0.69	0.73	0.58	-0.16-1.98

Note. SD=Standard deviation.

Time-domain analyses measure the changes in interbeat-intervals (IBIs) between successive normal cardiac cycles (see 2.5 for discussion). Thus, IBIs were determined on a beat-to-beat basis as the difference in time of the peak voltage of the R-wave and the peak voltage of the subsequent R-wave, known as RR intervals (see Figure 4.2). Based on recommendations (Heathers, 2021; Quintana, 2021; Quintana & Heathers, 2014), the time-domain parameter of square root of the mean of the sum of the square differences between adjacent NN intervals (rMSSD) was measured.

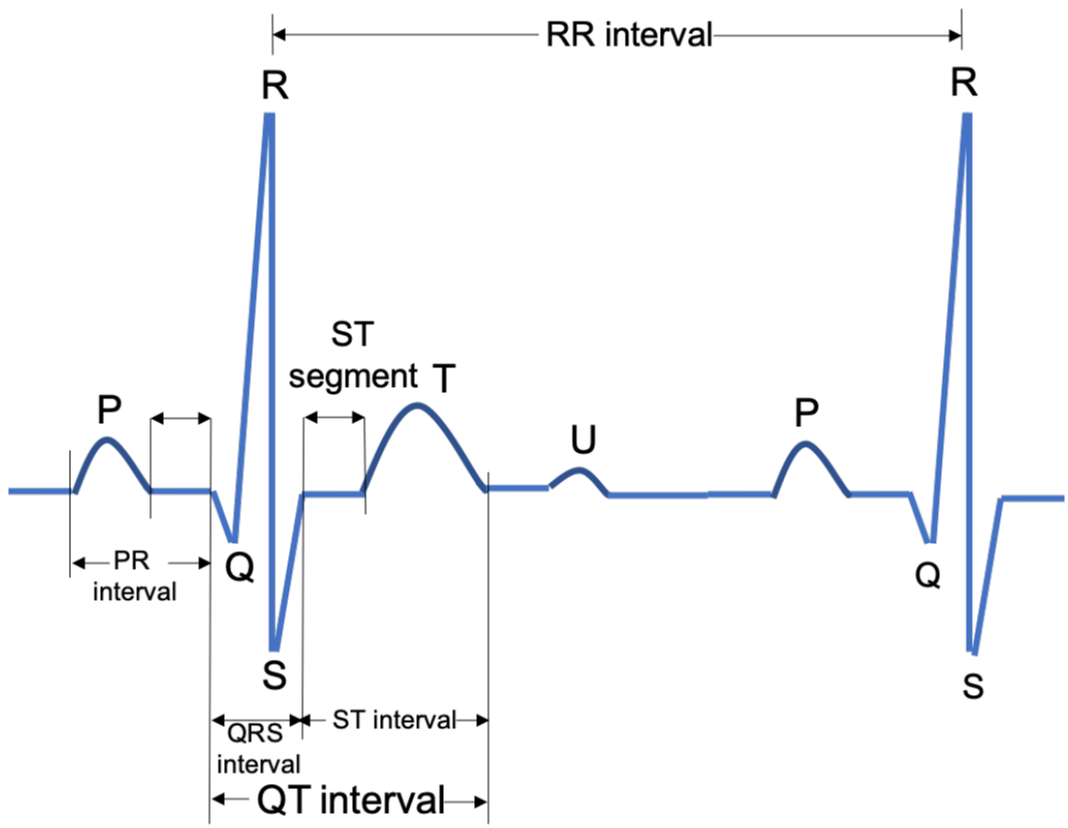


Figure 4.2. Schematic plot of an ECG cycle (modified from Vaswani et al., 2022)

rMSSD is the most prevalently used HRV metric due to its statistical robustness (Pham et al., 2021) and has been described by Thayer and colleagues (2010) as the gold standard measure of HRV. It is derived by first calculating each successive time difference between RR intervals in milliseconds. Each value is then squared and the square root of the total is obtained by averaging the result (Shaffer et al., 2014). rMSSD thus reflects the variance in RR intervals and is primarily used to estimate vagally mediated changes to cardiovascular reactivity. Elevated levels of rMSSD are theorised to reflect greater vagal activity, thereby leading to greater parasympathetic nervous system (PNS) activation. Decreased levels of rMSSD are associated with lessened vagal activity and PNS activation. rMSSD is less reactive to fluctuations in respiration rate than other HRV indices (e.g. high-frequency HRV, see below; Hill et al., 2009) and is therefore suggested to be a more robust index of vagal tone, compared to other indices. As such, rMSSD was selected to be the primary measure of HRV.

Frequency-domain parameters estimate the power spectral density of the RR-interval time series. That is, they estimate the distributions of oscillations which are separated into bands from ≈7 to 25 s (0.04–0.15 Hz; low-frequency) and 2.5 to ≈7 s (0.15–0.4 Hz; high frequency (Heathers, 2014). High and low-frequency HRV are suggested to reflect PNS and sympathetic nervous system (SNS) activity respectively. The ratio of low-frequency to high-frequency HRV has also commonly been used as a measure of the relative contributions of the PNS and SNS. This concept of associating frequency bands with autonomic responding has, however, been controversial and will be discussed below.

Short-term recordings (i.e. ≤5 minutes) can effectively determine high-frequency HRV, long-term recordings (i.e. ≥24-hours) are required to adequately record low-frequency components (Pham et al., 2021). Due to pragmatic considerations, indices of high-frequency HRV were analysed in the present work. Furthermore, to stay in line with the published literature, low-frequency to high-frequency power ratios (LF:HF) of HRV were also analysed.

High frequency (HF) HRV reflects rhythmic fluctuations in heart rate in the respiratory frequency band (0.15–0.4 Hz) and is suggested to index parasympathetic control and vagal tone (Berntson et al., 2017). Evidence for this relationship comes from research where pharmacological cardiac parasympathetic blockades, such as adrenergic receptors, were administered to human participants and resulted in the elimination of heart rate fluctuations above 0.15 Hz (Akselrod et al., 1981; for review, see Berntson et al., 2017). Accordingly, lower HF power is associated with stress, whereas higher HF power is associated with recovery from stress (e.g. rest-and-relaxation response, see 2.5.3; Reynard et al., 2011). As HF HRV is theorised to index PNS, and consequently vagal, activation, HF HRV index values should correlate with rMSSD values (Laborde et al., 2017). Correlations between rMSSD and HF values will be conducted on data collected within the present thesis as a manipulation check to ensure that both parameters measure the same processes.

HF HRV is, however, highly susceptible to the potential influence of respiration (Thayer et al., 2011). Within the present work, the experimental tasks require participants to speak aloud and, thus, modulate respiration. This may lead to unexpected and unpredictable variance in HF HRV (Nunan et al., 2010). While respiration may be controlled for in HRV analyses, according to Thayer and colleagues (2011) correction of HRV for respiration is problematic for two primary reasons. Firstly, protocols are fashioned from results within clinical samples and are not appropriate for use in non-clinical populations. Secondly, variance removal reduces estimated parameter values, thereby potentially removing variance which may be attributable to the experimental condition. As such, the present research will not correct HF HRV for respiration but will also not use HF HRV as the primary outcome measure for HRV analyses.

Where HF HRV is thought to reflect PNS activity, LF HRV is conversely assumed to be associated with SNS activity (Malik, 1996). However, LF HRV is highly influenced by respiration and baroreflex activity (e.g. blood pressure changes). The ratio of LF to HF HRV has been proposed to quantify the balance between the arms of the autonomic nervous system (ANS); a model known as sympathovagal balance. According to this model low LF:HF values represent PNS dominance (i.e. rest-and-relaxation response), and high values reflect SNS dominance (i.e. fight-or-flight response). LF:HF HRV indices were derived and analysed in the present work to provide insight into any potential changes in ANS activation as a result of the experimental task(s).

There have been challenges to the assumption that LF:HF ratio measures sympathovagal balance (Billman, 2013). Firstly, as mentioned, LF HRV variability can be induced by factors other than vagal stimulation, such as baroreflex activity. Secondly, PNS and SNS interactions are complex, non-linear, and often non-reciprocal (Shaffer & Ginsberg, 2017). The assumption that PNS and SNS interact perfectly is argued by Billman (2013) to oversimplify the complex division of the ANS. Thus, the values from LF:HF HRV parameters are used in the present work to provide further triangulation of evidence from rMSSD and HF HRV analyses and are approached with caution.

4.4.3 Questionnaires

In this section, I discuss the questionnaires used in the quantitative studies. This section will include an overview of each measurement item and, where appropriate, estimates of reliability using data collected within the present collection of studies (see Appendices P-S).

4.4.3.1 Fundamental Needs and Mood Questionnaire

The fundamental needs and mood questionnaire (Gonsalkorale & Williams, 2007) consists of 16 items that measure an individual's self-reported need for belonging, self-esteem, meaningfulness, control, and mood after Cyberball gameplay. This measure was used as a manipulation check of the emotion elicitation paradigm (see 2.5.2) in Studies Two and Four. The average Cronbach's alpha for each subscale, derived from all data collected from the present thesis was variable; with self-esteem (α=.778), belonging (α=.774), and mood (α=.680) demonstrating acceptable fit and control (α=.694) and meaningfulness (α=.357) evidenced as having poor internal reliability. Some caution should therefore be applied to the results from these subscales.

Needs threats were measured on a 5-point Likert scale, and participants were asked to identify the extent to which they agreed with specific statements. Each item was anchored from 1 (not true) to 5 (very true). Example items are: "I felt good about myself" and "I felt I have control over the course of the interaction". Items for each subscale were summed and then divided by the total number of items to yield a score of specific needs threat.

Mood was measured on a series of visual analogue scales (VASs) anchored by the following four bipolar mood items: good-bad; happy-sad; aroused-not aroused; and relaxed-tense. Responses to these items were summed and then divided by four to yield a composite score of mood. Positive affect labels were anchored numerically by 0 and negative affect labels were anchored numerically by 100. Participants were asked to rate their current feeling on each VAS by positioning their cursor on the line and pressing the left button on the mouse. The fundamental needs and mood questionnaire items were presented in a fixed order.

There is limited evidence of construct validity for the fundamental needs and mood questionnaire, with the first validation effort only being published in 2017 (Gerber et al., 2017). Furthermore, only needs items have been assessed for validity. Item convergent validity was evidenced through significant correlations (*r*s = 0.22 to 0.48) with subscale scores for the Sheldon Scale (Sheldon et al., 2001). The Sheldon Scale measures threat to needs, such as autonomy, self-esteem, and self-actualisation-meaning. The authors concluded that divergent validity was thus supported, indicating that the fundamental needs questionnaire did reliably measure needs threat construct. As other measures of social pain or needs threat were not collected in either quantitative study in the present thesis, it was not possible to calculate divergent validity for the present data.

However, Gerber and colleagues (2017) demonstrated that the factorial validity of the fundamental needs questionnaire was poor, through confirmatory factor analysis (CFA; see Chapter Six for further details of factor analysis) of a four-factor structure, $\chi2=176.83$, $p<.005$, RMSEA=0.12, CFI=0.92, TLI=0.89, SRMR=0.07. There was also evidence of high cross-loadings and high factor correlations, suggesting a lack of distinction between the subscales. To assess factorial validity for data collected as part of the present thesis, a CFA was run on all fundamental needs data. The CFA demonstrated poor model fit almost exactly replicating results from Gerber and colleagues' (2017) analysis, $\chi 2(38, N=381)=227.074$, $p<.001$, RMSEA=0.114, CFI=0.921, TLI=0.885, SRMR=0.059 (see Appendix N). It may be inferred that the needs-threat scale does not necessarily measure distinct needs, as indicated by the four subscales, but may instead document a general sense of needs threat. As the work contained in the present thesis only uses this scale as a manipulation check following Cyberball gameplay and does not use the measure to distinct effects of the game or interventions on fundamental needs, this is not appraised to pose negative implications to any of the results found or inferences made.

4.4.3.2 The Positive and Negative Affect Scale – Extended

To measure the effects of the intervention on state emotion (dependent variable), the Positive and Negative Affect Scale – Extended (PANAS-X; Watson & Clark, 1994) was used after all experimental tasks. According to Barrett (personal communication, September 13, 2017), for research underpinned by the TCE, the PANAS-X is the most appropriate measure of state emotion currently available. The PANAS-X was used to measure state emotion in Study Two and Four.

According to the TCE (Barrett, 2017b): the terms 'positive' and 'negative' represent the orthogonal dimensions of valence and arousal which comprise the theoretical framework constituting emotional experience, known as affect (Watson et al., 1988). Positive affect (PA) refers to the extent to which an individual perceives feeling enthusiastic, active, and alert; self-reporting high levels of PA indicates an optimal state of energy, concentration, and pleasurable engagement whereas a low score suggests sadness and fatigue (Chida & Steptoe, 2008). Conversely, negative affect (NA) reflects the perceived levels of individual subjective distress across a myriad of states, including fear and anger. Higher ratings on the negative affect scale denote emotional pain and unpleasant engagement whilst lower ratings signify calmness and serenity (Alonso-Arbiol & van de Vijver, 2010). The standard measure of PA and NA has been suggested to be the Positive and Negative Affect Schedule (PANAS; (Watson & Vadiya, 2012); with the original paper (Watson et al., 1988) being cited over 33,000 times. The PANAS contains two 10-item scales, assessing the dimensions of PA and NA respectively.

The popularity of the PANAS as a measure of state affect is reflected in the ubiquitous, cross-cultural translation of the scale. The PANAS has been translated into numerous languages, including Spanish (Robles & Páez, 2003), French (Gaudreau et al., 2006), Russian (Osin, 2012), Dutch (R. D. Hill et al., 2005), Japanese (Sato & Yasuda, 2001), and Hindi (Pandey & Srivastava, 2008). As the field of emotion research has matured, however, the validity of measures that are wholly dependent upon the bi-polar hypothesis have been questioned. The bi-polarity hypothesis contends that the opposites of the orthogonal dimensions are perfectly negatively correlated (J. A. Russell & Carroll, 1999). That is, positive and negative emotions are mutually exclusive. Empirically based conclusions of the existence of emotion valence independence, however, may not adequately represent the nuances of affective experience. Both lay perspectives and emotion theorists suggest that individuals may perceive the co-occurrence of a range of competing emotions (J. A. Russell, 2017). For example, when 116 individuals were asked to report their emotional experience after watching either a bittersweet film clip of a father sacrificing himself to save his son’s life, a control clip of a couple dating, or neither film clip, individuals who saw the bittersweet film clip were more likely to report feeling both happy and sad compared to when watching a neutral or neither film clip (Larsen & McGraw, 2011). It may therefore be argued that measures of emotion must be able to capture the nuanced complexity and granularity of emotional experiences beyond the bi-polar boundary conditions of positive and negative affect (Hoemann et al., 2017).

To overcome the methodological issue surrounding the bi-polarity hypothesis (Barrett & Russell, 1998), the PANAS was broadened and the Positive and Negative Affect Schedule – Expanded (PANAS-X; Watson & Clark, 1999) was developed. The PANAS-X is a 60-item self-report instrument measuring the two broad affective dimensions of general positive (GPA) and negative (GNA) affect, as well as the correlated yet distinguishable constellations of 11 discrete affective states. The discrete affective states are organised into two categories: (1) basic negative emotions, including fear, hostility, guilt, sadness, shyness, and fatigue; and (2) basic positive emotions, including joviality, surprise, serenity, self-assurance, and attentiveness. It has been suggested that by exploring the discrete affective states which sum the dominant affective dimensions of positive and negative affect, researchers may better assess variance in mood states (Watson & Clark, 1999) in a manner that is sensitive in disambiguating emotion blends and mixed emotions (Watson & Stanton, 2017).

The PANAS-X is a 60-item scale that measures overarching general positive (GPA) and negative (GNA) affect, as well as specific mood states (fear; sadness; hostility; guilt; shyness; fatigue; joviality; self-assurance; surprise; attentiveness; and serenity). The GPA scale is comprised of the items: active; alert; attentive; determined; enthusiastic; excited; inspired; interested; proud; and strong. The GNA scale items are: afraid; ashamed; distressed; guilty; hostile; irritable; jittery; nervous; scared; and upset. Respondents rate the extent to which they have experienced the emotion item on a 5-point Likert scale, anchored from 0 ('very slightly or not at all') to 4 ('extremely'). Responses are summed to provide a rating of PA and NA; with the minimum score being 0 and the maximum score being 40 for both scales. The PANAS is posited to provide a measure of emotion across the bi-polar constructs of valence and arousal (Russell, 1979; Watson et al., 1988).

In both Study Two and Three, to avoid potential inflation of Type I/II errors the overarching subscales of General Negative Affect (GNA) and General Positive Affect (GPA) were first analysed, unless otherwise explicitly stated. If either GPA or GNA indicated significant differences between the groups, all associated subscales would be analysed. While all reliability and validity indices are reported below, this ensured that some subscales were not included in any analyses contained within the present work.

Evidence for PANAS-X validity comes from investigations into factorial, convergent, and discriminant validities in 1100 responses from a Portuguese non-clinical adult sample (Costa et al., 2020a). Within this work, factorial validity was assessed using confirmatory factor analysis, with the PANAS-X demonstrating acceptable fit according to goodness-of-fit indices (for details on fit indices, see Chapter Six), $\chi2(158)=828.137$, $p<.001$, CFI=.911, GFI=.926, TLI=.893, RMSEA=.062, 90% CI [.058, .066], with all items loading significantly onto the respective subscales. Using invariance testing, the PANAS-X demonstrated configural invariance, where all factor loadings and item intercepts freely vary across groups, and metric invariance, where factor loadings are constrained, ΔCFI=.001, and scalar invariance, where loadings and intercepts are constrained, ΔCFI=.003 between the genders (male, female), thus indicating the factorial validity of the PANAS-X. Convergent validity (Costa et al., 2020) – as evidenced through average variance extracted – was low and below the threshold of acceptability (>.5; Hair, 2009), at .307 and .391 for GNA and GPA respectively. Costa and colleagues (2020) estimated discriminant validity through the calculation of the square root of average extracted mean, which was found to be higher than the inter-factor correlations at .076. There is strong evidence from both within the present work and from Costa and colleagues' (2020) analysis that the PANAS-X is a valid and robust measure.

The reported Cronbach's alpha statistics are derived from all PANAS-X data[3] collected in this thesis and are presented in table 4.2 (see Appendix S). The internal consistency reliabilities have comparable corresponding values for the scales in the original PANAS-X (Watson and Clark, 1999) and are within satisfactory levels (Robertson & Evans, 2020), except for shyness, fatigue and attentiveness. However, as these subscales are not used in any analyses contained within the present thesis, this is not seen as having potential negative implications for any results contained herein.

Table 4.2. Cronbach's alpha, descriptive statistics, and exemplar items for the PANAS-X derived from all English PANAS-X data (N=227) collected within this thesis

Subscale	α	α 95% CI	Exemplar items

[3] The results presented from PANAS-X data analyses only pertain to responses to the original English language based PANAS-X. For analysis of responses from the Dutch version of the PANAS-X (PANAS-XD), see Chapter Six.

		Lower Bound	Upper Bound	M (SD)	R.	Max.	
GNA	.721	.664	.773	6.42 (5.41)	0-27	40	Afraid, distressed
GPA	.826	.790	.858	9.24 (7.10)	0-33	40	Active, determined
Fear	.709	.646	.764	4.36 (4.07)	0-18	24	Afraid, Shaky
Sadness	.676	.604	.738	5.07 (3.85)	0-17	20	Sad, Blue
Guilt	.721	.660	.773	3.64 (4.04)	0-18	24	Ashamed, Blameworthy
Hostility	.637	.559	.706	4.94 (3.90)	0-17	24	Angry, Loathing
Shyness	.490	.372	.590	3.36 (2.63)	0-12	16	Shy, Timid
Fatigue	.336	.183	.467	4.82 (2.941)	0-12	16	Sleepy, drowsy
Surprise	.754	.692	.804	2.55 (2.37)	0-9	12	Amazed, astonished
Joviality	.830	.794	.861	8.19 (6.05)	0-30	32	Happy, energetic
Self-Assurance	.737	.681	.787	6.15 (4.46)	0-19	24	Proud, strong
Attentiveness	.396	.256	.515	4.40 (2.78)	0-14	16	Alert, determined
Serenity	.809	.762	.849	4.38 (3.49)	0-12	12	Calm, relaxed

Note. α=Cronbach's alpha; R.=Range of actual data; Max.=Total possible maximum score; GNA=General negative affect; GPA=General positive affect

Before proceeding with inferential statistics, as the PANAS-X is the primary outcome measure assessing state emotion, the dimensionality of the PANAS-X was assessed through principal component analyses (PCA). All English-language PANAS-X data collected within this thesis was aggregated into a single database, with all sub-scales subject to PCA to ensure comprehensive checks of internal validity. The fear (eigenvalue: 2.51; total variance: 41.73%), hostility (eigenvalue: 2.59; total variance: 43.18%), guilt (eigenvalue: 2.711; total variance: 45.19%), sadness (eigenvalue: 2.204; total variance: 44.07%), fatigue (eigenvalue:

1.83; total variance: 45.83%), self-assurance (eigenvalue: 2.61; total variance: 43.44%), serenity (eigenvalue: 2.18; total variance: 72.62%), attentiveness (eigenvalue: 1.95; total variance: 48.62%), and surprise (eigenvalue: 1.66; total variance: 55.32%) subscales, respectively converged onto one-component solutions. The joviality subscale converged onto two distinct components explaining 50.20% and 14.47% of the variance respectively (eigenvalues: 4.016, 1.16), which may indicate a lack of consensus in participants' item interpretation for joviality items. This result is unlikely to have implications for any of the research contained within the present thesis as the joviality subscale was not used for any analyses.

Finally, a PCA with two components for GPA and GNA was conducted with a Direct Oblimin rotation applied. Oblimin rotation was used as it was assumed that the two components would correlate with each other. All GPA items, except 'attentive', loaded onto the first component and had no cross-loadings ≥.4 on the second component. All GNA, except 'distressed', loaded onto the second component and had no cross-loadings ≥.4 on the first component. The two values explained 43.66% of the total variance (eigenvalue: GPA=5.23, GNA=3.50). While it is recognised that eigenvalues for four components fell above the Kaiser criterion of ≥1, inspection of the component loadings indicated that a four-component solution was not tenable due to high numbers of cross-loadings and the fourth component lacking any loadings ≥.4. As such, the two-component solution is reported. The results suggest a satisfactory level of stability in the PANAS-X solution for the studies contained within this thesis and that scores are a valid representation of the measured constructs. All items and factor matrices are provided in Appendix O.

While the PANAS-X data collected within the present work has been evidenced to be a valid measure, criticism may be levelled at the PANAS-X more generally based on theoretical suppositions. The PANAS-X may arguably demonstrate an overreliance on emotion words to measure state emotion. The degree to which individuals can differentiate between affective states with precision using linguistic markers is known as emotion granularity (Kashdan et al., 2015). High granularity represents an ability to describe and name emotional experiences with high specificity, whereas low granularity represents descriptions of emotion experiences in more global terms. Each individual's level of emotion granularity can be influenced by a myriad of factors such as developmental and educational experiences (Nook, Sasse, et al., 2017). Individuals with low emotional granularity may have access to fewer emotion words to describe their emotional state (Lindquist & Barrett, 2008), leading to nominations of global emotion words, rather than specific and precise markers. I would suggest, however, that while emotion granularity differs between individuals, in the current study if an individual can generate even the most basic of emotion words, such as anger or sadness, their self-reports can add to a wider network of nominated words through which a deeper understanding of the affective processes can be made.

4.4.3.3 Sample Characteristics: Demographics

Participants were asked to report their age, gender, and ethnicity as part of a demographic characteristic assessment.

4.4.3.4 Sample Characteristics: Difficulties in Emotion Regulation Scale

ER proficiency was assessed using the Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). This 36-item self-report scale measures overall ER difficulties. Participants are asked to identify the extent to which they agree with given statements, such as "When I'm upset, I become angry with myself for feeling that way" and "I am confused about how I feel", on a 5-point Likert Scale anchored by 1 ('Almost never') to 5 ('Almost always'). Responses are summed to yield a total value between 36 and 180 with higher scores indicative of higher levels of emotion dysregulation. The DERS subscale responses may be disaggregated into six subscales, however, for the present analyses, only the total DERS scores were analysed. Within the data collected for Study Four, the overall DERS score demonstrated excellent internal consistency (α=.936).

Factorial and convergent validity of the DERS has been demonstrated by an analysis of 357 American undergraduate student responses (Gratz & Roemer, 2004). The exploratory factor analysis (EFA) results found that all items loaded highly (>.4) onto the appropriate underlying factor (*N*=6) and accounted for 55.68% of the total variance. To assess convergent validity, DERS scores were correlated with scores from the Generalized Expectancy for Negative Mood Regulation Scale (NMR; Catanzaro & Mearns, 1990); a 30-item scale that measures self-reported skill in regulating negative moods. DERS scores correlated highly with NMR scores (*r*=.33-.63), which the authors concluded evidenced DERS convergent validity. Thus, there is evidence that the DERS is a valid and reliable measure of ER difficulty from both Gratz and Roemer's (2004) work and the results from the present research.

4.4.3.5 Sample Characteristics: Toronto Alexithymia Scale

Alexithymia is a construct epitomized by an individual's inability to recognize, communicate information about, and an absence of, emotions (Honkalampi et al., 2000). The Toronto Alexithymia Scale – 20-item Scale (TAS-20; Bagby et al., 1994) was used as a measure of alexithymia. The TAS is a self-report measure consisting of 20 items, such as "I am often confused about what emotion I am feeling", on a 5-point Likert scale. Each item is anchored by 0 ('strongly disagree') and 5 ('strongly agree'). TAS-20 scores can be derived from the summing of all responses or disaggregated into three subscales: externally-orientated thinking; difficulty describing feelings; and difficulty identifying feelings. Total scores on the TAS can range from 30 to 80. The present research will only use the total scores to provide insight into sample alexithymia levels. The TAS uses cut-off scoring for total values; scores equal to or less to 51 indicate non-alexithymia, scores of 52-60 indicate possible alexithymia, and scores equal or greater to 61 indicate alexithymia. Within the data collected for Study Four, TAS-20 scores demonstrated acceptable internal consistency (α=.870).

The factorial validity has previously been evidenced by both EFA and confirmatory factor analyses (CFA; Bagby, Taylor, et al., 1994). The EFA analyses (N=965), rotated with a varimax solution, produced evidence of the three-factor structure, with all items loading significantly onto the appropriate subscales. CFA provided further evidence of a three-factor solution, $\chi2(167, N=401)=502.85$, $p<.001$, GFI=.886, RMSEA=.069 and $\chi2(167, N=401)=502.85$, $p<.001$, GFI=.886, RMSEA=.069, with all items loading significantly onto the respective subscales. Convergent validity of the TAS-20 has further been demonstrated by the high correlations between total scores and measures of self-disclosure difficulty and ability in 330 North American adults (Loiselle & Cossette, 2001). Constructs which are theoretically associated with one's ability to recognise and describe internal emotional states. The TAS-20 is, therefore, assumed to be a valid measure.

4.4.3.6 Sample Characteristics: The COPE Inventory - Focus on and Venting of Emotions subscale

The 'Focus on and Venting of Emotions subscale' (VENT) from the COPE Inventory (Carver et al., 1989) was used to measure levels of trait emotion venting behaviours. The VENT subscale is comprised of four items (e.g., "I get upset and let my emotions out"), for which participants are asked to identify the extent to which they agree with each item on a 4-point Likert scale; items are anchored by 1 ('I don't do this at all') and 4 ('I do this a great deal'). Items are summed to produce scale scores, with scores ranging from 4 to 16. Higher scores reflect greater use of venting emotions. Within the data collected for Study Four, VENT scores demonstrated acceptable internal consistency ($\alpha=.658$).

Factorial validity of the VENT subscale was demonstrated by Carver and colleagues (1989), with all items loading onto the factor well (>.4) and demonstrating high internal consistency ($\alpha=.77$). Convergent validity was demonstrated by an inverse, significant relationship between VENT responses and self-reported feelings of control and internal locus of control ($r=-.16$, $p<.001$). That is, individuals reported being more likely to use venting behaviours when they do not feel in control. Thus, the authors concluded that the VENT subscale demonstrated high factorial and convergent validity and is an appropriate measure to use to capture associated behaviours.

4.5 Inferential Statistics

When undertaking hypothesis testing, statistical analyses were conducted usingFrequentist statistics. Frequentist statistics were performed using R, SPSS, and JASP.

4.5.1 Frequentist Statistics

In this thesis a range of frequentist statistics are used, most frequently *t*-tests and analyses of variances (ANOVAs). Unless otherwise specified, α was always set at .05. In line with recommendations (Lakens, 2013), when reporting *t*-test effect sizes, common language effect sizes will also be reported.

Where post-hoc analyses require corrections to multiple comparisons, Holm correction will be applied (Aickin & Gensler, 1996) and both the original and adjusted values will be reported. Holm corrections progressively adjust α threshold values to iteratively accept and reject hypotheses (Holm, 1979), and are more powerful than Bonferroni corrections (Aickin & Gensler, 1996; Giacalone et al., 2018; Holm, 1979) by providing control over the family wise error rate by adjusting the rejection criteria for each hypothesis.

Using this method, all *p*-values are placed in ascending order (i.e., $p_1 \leq p_2 \leq \cdots p_n$), and each *p*-value (*m)* is multiplied by rank:

Equation 4.1.

$$p_{(1)} \cdot (m + 1 - 1) = p_{(1)}(m)$$
$$p_{(2)} \cdot (m + 1 - 2) = p_{(2)}(m)$$
$$p_{(3)} \cdot (m + 1 - 3) = p_{(3)}(m)$$

The Holm correction method results in adjusted *p*-values that can be compared to the previously stipulated α threshold (0.05). Once a non-significant result is found, all subsequent *p*-values are rejected – even if, following the method, the value would have yielded a significant result. This rejection is denoted by the subsequent values being given the sample *p*-value was the first non-significant result. For example, when adjusting four *p*-

values (0.001, 0.012, 0.038, and 0.041) the Holm correction method would yield the following:

Equation 4.2.

$$p_{(1)} = 0.001 \times 4 = 0.004$$
$$p_{(2)} = 0.012 \times 3 = 0.036$$
$$p_{(3)} = 0.038 \times 2 = 0.076$$
$$p_{(4)} = 0.041 \times 1 = 0.076$$

Thus, Holm corrected values included in the present thesis will follow the above equation and the level of significance should be assessed in line with α set at 0.05.

4.5.2 Unanalysed Data

Across the two experimental studies data was collected which was not analysed. In the study investigating venting: saliva samples were collected at baseline, 20-minutes post-intervention, and 40-minute post-intervention in 40 participants, to analyse levels of salivary cortisol changes between the experimental groups. In the study exploring swearing: pupillometry (pupil size change) was recorded throughout Cyberball gameplay. The training to analyse both salivary cortisol and pupillometry data was planned to occur in 2020. Due to the global pandemic, where I was living in Oxford and the training was to occur at either Keele University or the Netherlands, it was not possible to complete either training and so the data was not analysed or included in the present thesis.

Due to an error in the data management protocol, raw data was lost for the DERS, VENT, and TAS-20 questionnaire data for Study Two. The partially recovered data (n=98) was analysed and included in the present thesis.

Chapter Five: Venting as Emotion Regulation

In Study One, venting was tentatively identified as fulfilling speech-based emotion regulation (ER) functions in everyday life, in line with theoretical stipulations of the Process Model of Emotion Regulation (PMER; Gross, 2015) and the Theory of Constructed Emotion (TCE; Barrett, 2017b; see 3.5). Venting will thus be the focus of this chapter, which comprises the first experimental study. Having demonstrated both the prevalence and the perceived efficacy of the behaviour within Study One, predictions about the effect of venting as an ER strategy may be made. It would be expected that venting may down- or up-regulate intense state emotionality, thereby allowing the individual to reach a more optimum emotional state in line with their regulatory goals. Despite the high frequency of occurrence of verbal expression after emotional events in daily life, as documented in Chapter Three, venting research is comprised of a small constellation of studies that fail to satisfactorily document causality of venting processes, fail to adequately measure outcome variables, and do not systematically investigate the phenomenon. To date, only four papers have been published that experimentally manipulate or qualitatively explore verbal venting (i.e. speech-based venting) within non-clinical populations. Information about venting and any regulatory functions it may fulfil are thus incomplete. Given that venting was identified by over 90% of participants in Study Two, there is a strong rationale for a systematic investigation into this under-researched behaviour.

The present chapter tests specific hypotheses investigating whether venting regulates biological or cognitive aspects of an emotion, as indicated in the qualitative study (see Chapter Three) to bridge this gap in understandings about venting. In the literature review on the specific topic of venting, I will discuss the identified literature that experimentally manipulates or qualitatively explores verbal venting. The research will be presented chronologically based on publication date and structured according to findings that suggest adaptive (5.2) or inconclusive (5.3) effects. Subsequently, I will discuss the evidence available from correlational studies that venting is a maladaptive behaviour (5.4).

I will then conclude by summarising the literature to date (5.5) and situating the current study in the available gaps in the literature left by the published research (5.6). This chapter will thus investigate whether and how venting affects emotions associated with social ostracism (5.7 and 5.8), and discuss these findings (5.9) in line with the theoretical and epistemological framework of the study (see Chapters One and Two respectively).

5.1 What is Venting

In the present thesis, venting was defined as expressive speech used to regulate emotion in response to events or situations which elicit high-intensity emotion (see 2.5.4.3).

5.2 Adaptive Outcomes

Despite the lack of an established definition, two ethnographic studies (Burchard, 2001; van Wijk & Dalla Cia, 2016) – that is, descriptive studies of human behaviour – have been conducted. These studies aimed to provide a body of evidence that would identify and disambiguate venting behaviours from other speech behaviours associated with emotion (e.g., shouting, social support seeking). Firstly, to provide a holistic overview of what comprises venting and venting behaviours, Burchard (2001) undertook an ethnographic study that aimed to identify the patterns of behaviour referred to as venting. To do this, Burchard (2001) observed the use of venting in natural interpersonal interactions between 11 student employees whom he supervised. The students were employed as resident assistants (RAs) at a university in North America; in this role, the students provide emotional and social support to tenants living in the given building. Data was collected in the RA staff room over four months and from thirty interviews.

The findings were broadly categorised into the following themes: (1) Scene; (2) Topic; and (3) Participants. The theme 'Scene' dictated whether venting occurred, to whom it was directed, and the extent to which disclosure transpired (Burchard, 2001). Venting was found to be constrained by situational and social affordances. Affordances refer to all action possibilities latent in the environment (Gibson, 1979), with different action possibilities allowing an act to occur (Suri et al., 2018). For example, the likelihood of deep venting (Burchard, 2001) – content covering detailed, personal issues - may be inhibited by perceptions of a lack of privacy. Where there were evident appraisals that a situation inherently lacked privacy, such as when the participants' boss (i.e. Burchard) was visibly present, venting was found to be less likely to occur.

The 'Topic' of venting was argued to be more than a simple free expression of minor issues. Rather it could relate to a myriad of topics, including concomitant emotions (e.g. anger), which caused some degree of psychological distress, usually focusing on the stressor itself, allowing the interlocutors to clarify issues and gain perspective on the experience transactionally via social feedback. The topic could relate to low-intensity stressors which occurred with high frequency (e.g. receiving chapter feedback from supervisors), or to high-intensity but low-frequency stressors (e.g. PhD viva); the crucial component which led to the elicitation of venting was noticeable psychological distress in the speaker (Burchard, 2001).

The theme 'Participants' related to the importance of with whom the venting was undertaken (Burchard, 2001). The partner was, by necessity, an individual with whom the venter felt validated and understood by, and with whom a close reciprocal social relationship was shared.

Burchard (2001) concluded that venting provided an avenue through which control could be taken and meaning could be made from negative events and experiences in a socially supportive space. It was stressed that venting does not occur within a vacuum, but that it is imperative to consider the wider social context when assessing the efficacy of, and the underlying rationale for employing, venting as a behaviour. Burchard (2001) argued that all three themes should be met for the verbal expression of distress to constitute verbal venting and concluded that further investigations into venting must be undertaken to explain any potential available effects.

In the second ethnographic study investigating how 32 submariners adaptively cope with occupational stress (van Wijk & Dalla-Cia, 2016), venting was found to occur frequently as a method of supporting social cohesion, occurring in private spaces with close others concerning shared negative experiences. The authors were military psychologists who observed the submariners during deployment and made extensive field notes, which included observations of verbal interactions between submariner crewmates. From this data, it was theorised that negative emotion was redirected through venting, allowing for the safe release of deleterious emotions which could otherwise have a detrimental impact on the society or culture of the sub-population. For instance, the authors suggest that venting privately to a close other reduced the likelihood of group disharmony or conflict. It is important to note that the topics about which venting was used related to typically occurring, socially shared experiences within submarine deployments, such as poor food quality (van Wijk & Dalla-Cia, 2016), rather than specific intrapersonal or highly stressful events.

These findings may be somewhat limited by the role of the authors as observers of naturalistic interactions. As in Burchard's (2001) findings where venting was less likely to occur when the boss – or in the case of van Wijk and Dalla-Cia's (2016) work, a psychologist – was visible, it is reasonable to suggest that researchers from outside the submariner community may not have been sufficiently trusted and thus may have been unlikely to witness venting of sensitive topics within a military space (van Wijk & Dalla-Cia, 2016). As such it may be posited that, as outlined in Chapter 2 and the work of Burchard (2001), venting is highly influenced by contextual affordances, including participant demographics and social status. The prevalence of venting behaviours observed in the ethnographic study (van Wijk & Dalla-Cia, 2016) would indicate that deeper venting may occur in private settings between trusted participants (e.g., Burchard, 2001). Venting is, therefore, at least from qualitative accounts (van Wijk & Dalla-Cia, 2016; Burchard, 2001), a behaviour inextricably linked with social relationships and emotion, and to both the elicitation and regulation of emotions.

Moving onto quantitative evidence, to my knowledge[4] there has been only one study identified where venting was associated with adaptive emotional outcomes. In this study, Nils and Rimé (2012) tested a model of when and how venting provides ER benefits. The authors hypothesised that venting associated benefits would be moderated by the form of emotion social regulation provided by the interaction partner (see 1.3). In short, social ER occurs when emotions are regulated through interpersonal interactions (Ochsner & Gross, 2008), such as cognitive reframing or empathy. Nils and Rimé (2012) posited that levels of emotional distress may be differentially reduced dependent on the form of interaction available to the participant. The authors hypothesised that (1) social exposure to cognitive reframing would stimulate cognitive ER in the participant, thereby down-regulating negative emotion, and (2) exposure to a socio-affective response (i.e. empathy) would up-regulate positive emotion. To investigate this, a 2 (regulation: reframing vs. no reframing) x 2 (response: socio-affective vs. neutral) study was conducted. Eighty-nine participants were exposed to a video sequence that was assumed to have the capacity to induce negative emotions (e.g. testimonies of children who were forced into prostitution) and were then instructed to vent their emotions to a confederate for five to ten minutes. Venting was directed through a structured discussion where dyads were asked to discuss: (1) the video content; (2) appraisal of the most salient or shocking aspects of the content; (3) whether the video influenced their opinion on humanity; (4) their opinion on the utility of such videos; and (5) to share their opinions on the video content. The discussion of all five points was suggested to comprise venting. It is noted here that these discussion points may not necessarily involve the free-form expression of emotion, as identified in the present definition of venting nor in Burchard's (2001) definition. As such, this study (Nils & Rimé, 2012) may fail to accurately generate venting behaviours in favour of retaining internal validity across dyads.

[4] Electronic database searches were conducted using PsycArticles, PsycInfo, Medline, and PubMed via EBSCO, and using Google Scholar. Keywords (e.g. venting, vent*, emotion regulation) were used. Boolean operators (e.g. 'AND') were applied to combine keywords, and truncation was used to retrieve variations of keywords through searching of titles and abstracts. Searches were restricted to research involving human subjects and made available in the English language.

During these discussions, confederates were directed to provide specific forms of social ER based on the experimental condition. In the reframing conditions, confederates were instructed to provide feedback that any emotions elicited by the video sequence were legitimate, but that the emotions may be regulated when considering the positive impact of the events (e.g., change in laws on paedophilia) or the positive outcomes humans have created outside of the events contained in the video (e.g., increased laws protecting children). This reframing was contrasted with the no reframing condition, where confederates were instructed to provide no such feedback. In the socio-affective response condition, confederates were asked to express support for the participant through displays of empathy, sympathy, and comprehension, whilst in the neutral response condition, confederates responded to participants with a detached, neutral attitude. To measure differences in regulation, state emotion was measured at two time-points – immediately post-venting and 48-hours later – using the negative affect scale of the Positive and Negative Affect Schedule (PANAS; Watson & Clark, 1994) and a scale which measured the level of emotional impact from one (“minimal upheaval”) to 10 (“maximum upheaval”).

The results indicated a complex relationship between venting and emotional outcomes. The study found that both immediately after venting and 48-hours later, participants exposed to cognitive reframing self-reported significantly lower levels of negative affect and emotional impact than those in non-reframing conditions. However, participants who were exposed to socio-affective responses self-reported significantly higher emotional impact of the film when compared with conditions without such responses at both time points. There was no evidence of interaction effects between the conditions. The authors suggested that exposure to cognitive social ER provides a model of ER that allows for sustained down-regulation of negative affect for 48-hours, whereas exposure to socio-affective support was argued to up-regulate or elicit negative emotion, likely through ruminative processes. It was thus concluded that the mere verbal expression of emotion does not automatically provide emotion regulatory functions, but that regulatory strategies (e.g., reframing) must be applied for regulation to occur. A note of caution is due here as no baseline measures of state emotion were taken. Without an indication of state emotion induced by the film clip exposure, it is difficult to assess the extent to which changes to state emotion were caused by, and not elicited from, the experimental condition.

The conclusions presented by Nils and Rimé (2012) reflect the findings available within the qualitative enquiry from the present thesis where participants reported engaging in a two-step linear process of externalising and processing to regulate emotions through speech (see 3.4.3.1). The application of regulatory strategies after verbal expression was suggested to be crucial for ensuring adaptive emotion outcomes. Modelled regulation made available during interpersonal interaction, such as reframing, were suggested by participants to be subsequently more easily and effectively applied, leading to more adaptive outcomes.

Furthermore, the suggestion that venting without access to social regulatory support serves to further up-regulate emotion was based on a measure of emotion – the impact scale – which has not been validated, whose construct reliability has not been evidenced, nor has it been used in the venting literature since. Furthermore, while the authors hypothesised that exposure to socio-affective support would elicit positive emotion, the scales used only measured negative emotionality. As such, I argue that the study failed to sufficiently measure emotion constructs and only provide partial insight into any potential model of venting. The study would have been much more convincing if the authors had adopted a standardised and holistic measure of emotion to evidence their proposed model. As discussed in Chapter Four (see 4.3), a more comprehensive study should include multi-modal, validated measures of emotion to provide persuasive and sufficient evidence of regulation.

Further, there was no data on how the interactions were standardised across dyads. As demonstrated in the findings from the qualitative study (see Chapter Three) social interactions are highly variable based on a myriad of factors (e.g. individual disposition, social ER skill) and individual differences may have confounded the results. Without details of these interactions, it is difficult to model how ER may have been achieved and whether there was standardisation in the interaction between each dyad. However, it is noteworthy that this is the sole experimental study manipulating verbal venting available in the literature and that it demonstrated positive psychological effects. Overall, this study (Nils & Rimé, 2012) supports the notion that venting may have adaptive outcomes and experimental investigations which model the potential outcomes of venting are both viable and required to best understand this behaviour.

5.3 Inconclusive Outcomes

Similar to the available evidence that venting provides adaptive outcomes, there is one published study that demonstrates inconclusive effects on state emotion. Lee and Wu (2015) investigated venting use after exposure to a medical malpractice case in 221 individuals who had previously written about their own experiences of medical disputes online. Participants read a vignette that outlined a story of negligent care provided to a paediatric patient which resulted in further hospitalisation. Consequently, participants self-reported the levels of anger, disappointment, uncertainty, and regret experienced as a result of reading the vignette, as well as their desire to engage in venting, revenge-seeking, social support seeking, and informational seeking behaviours. Participants were asked to imagine themselves undertaking one of these behaviours (e.g., imagine themselves venting to a close other) and reported their current emotional state on a single item asking them to what extent they feel better on a 7-point Likert Scale

The results found that high degrees of uncertainty were significantly correlated with a desire to engage in venting behaviours. However, there was no evidence that (imagined) venting either up-or down-regulated state emotion. Regardless of the lack of evidence, the authors concluded that because individuals who self-reported high levels of uncertainty were more likely to select venting as a regulation strategy, venting may fulfil functions that reduce uncertainty. This conclusion may be compared to the conclusions of Burchard (2001; see 5.2), who posited that venting allows the individual to take control of their emotional state and create meaning from the event. However, a note of caution must be applied here as Lee and Wu (2015) did not use a validated or demonstrably reliable measure of emotion after the experimental condition. Without a well-validated measure of emotion, it is difficult to assess these claims. The study would have been more convincing if they had adopted reliable and theoretically informed measures of venting or habitual ER use. The measurement of state emotion is a complex undertaking that required careful consideration (Barrett & Westlin, 2021). According to Barrett and Westlin (2021), without a theoretically informed approach to measurement, it is impossible to truly draw inferences relating to emotion processes from data. A much more systematic approach would be a research paradigm that gives sufficient consideration to measurement and uses standardised, validated protocols to offer an adequate explanation of any available effect. Thus, as the present study (Lee & Wu, 2015) focused on venting as an imagined behaviour, the next steps would be to explore the regulatory effect of actual venting on emotions.

5.4 Maladaptive Outcomes

Despite the available findings that venting may provide adaptive social outcomes (e.g., reduced conflict; van Wijk & Dalla-Cia, 2016), reduced negative emotion (Nils & Rimé, 2012), and the hypothesised function of providing control and meaning-making (Burchard, 2001), venting is assumed to be a dysregulatory behaviour (Parlamis, 2012)). That is, when applied as an ER strategy, venting is suggested to lead to a divergence between actual and goal emotional state (see 1.3 for discussion). Perhaps as concerning (if not more so) is the observation that venting has been suggested to lead to greater adverse outcomes in those employing venting in their daily lives (Brown et al., 2005; Grandey et al., 2004; Malooly et al., 2017; Orgeta & Orrell, 2014). There appears to be an assumption that people who habitually employ venting are unable to control emotion expression and who fail in regulating their emotions (Grandey et al., 2004; Yang & Sun, 2019). While, to date, there are no published studies that experimentally document verbal venting's supposed maladaptive effects, there is some correlational evidence from survey data taken from non-clinical samples which will be summarised below.

Two primary mechanisms underlying venting's maladaptation have been posited: venting as ER failure, and venting re-eliciting deleterious emotions. Regarding the claims that venting is indicative of ER failure: according to this hypothesis, venting is indicative of a dearth of regulatory resources which leads to an inability to self-regulate. Studies supporting this idea have aimed to model the predictors and outcomes of emotion regulatory behaviour implementation (e.g. Grandey et al., 2004; Yang & Sun, 2019). For example, using survey data Grandey and colleagues (2004) assessed the relationship between self-reported coping strategy use, such as venting, and levels of self-reported occupational stress in 197 American call-centre workers. Levels of occupational stress were later correlated with workplace absenteeism in the 3-months following data collection. The authors found that venting was positively associated with the prevalence of highly stressful occupational experiences and, separately, that prevalence of highly stressful experiences predicted workplace absenteeism. It was thus suggested – but not fully substantiated with statistical analyses as the study design was cross-sectional and causal links cannot necessarily be inferred – that venting may lead to workplace absence.

Elsewhere, 161 American salespeople were asked to recall a recent occupational experience that resulted in a loss of business, rate the level of negative emotion elicited by the memory, and also self-report coping strategy use (Brown et al., 2005). Using this survey data, the authors found that participants who self-report higher levels of habitual venting use were significantly more likely to rate a recent emotional experience as more negative. The authors argued that this effect was indicative of trait styles of coping, which ensure that emotional events are not adequately managed or processed by the individual. It is noted here that the study design was cross-sectional and thus causality cannot be inferred from the results. Despite the conclusions presented within these papers, no data are available which allow for the testing of such an assertion. Indeed, these papers would appear to be over-ambitious in their claims. The conclusions do not appear to be supported by any empirical evidence; rather, the authors have connected two disparate findings without substantive support. This trend occurs across most research that subscribes to the hypothesis that venting indicates emotion regulatory failure, as such, it is unclear the extent to which the evidence supports the claims. Instead, I argue that the suggestions are limited due to a lack of empirical investigation and have generally been supported by argument rather than evidence. However, the findings of studies presented may support the assumption from the present thesis that venting is a behaviour used during periods of high emotionality and thus there appears to be a definite need for further exploration of this behaviour.

As previously described, the second hypothesis for venting's maladaptive outcomes is that it re-elicits deleterious emotions, thereby leading to dysregulation. This proposition is underpinned by the assumption that venting serves as a rumination mechanism that up-regulates negative emotion, thus sustaining and stimulating psychological distress. Rumination is defined as a pattern of thinking which focuses one's attention, thoughts, and behaviours on a negative emotional state (Nolen-Hoeksema, 2004). Studies supporting this hypothesis aimed to identify participant outcomes after negative experiences, where venting use is modelled as a mediating factor. For example, to identify the most effective strategies for reducing distress in response to perceived racism, a sample of 145 individuals living in a rural community in Hawai'i were asked to completed measures of psychological distress, trait regulation strategies (e.g., venting, acceptance), and self-reported degree of racism experienced over the past year (Kaholokula et al., 2017). The results indicated that the relationship between self-reported perceived racism and psychological distress occurred indirectly when mediated by self-reported levels of venting use. Higher levels of self-reported perceived racism were related to greater use of venting and increased use of venting was related to higher levels of psychological distress. The authors concluded that venting was likely to ensure the individual continuously relived the perceived racist, and other negative, events continuously through venting and thus maintaining high levels of psychological distress.

Consistent with the previously discussed inferences from Kaholokula and colleagues (2017), more recent evidence available during the COVID-19 pandemic has found that venting mediates the association between job demands and psychological distress in 615 Israeli social workers (Ben-Ezra & Hamama-Raz, 2021). Similarly, in a convenience sample of 586 individuals from the general population in Portugal, venting was identified as a risk factor for psychological distress during COVID-19 lockdowns (Ferreira et al., 2021). In these studies, it was theorised that venting may up-regulate or re-elicit negative emotion, which thus causes the individual to appraise the situation as more negative through rumination processes. That is, through venting, the individual focuses on the negative experience and increases their psychological distress, rather than engaging in active strategies to mitigate or reduce the impact of the experience. While potentially compelling, these studies are limited in terms of study design; the cross-sectional designs used do not allow for the examination of causal links between venting and other variables. As the well-known adage maintains, correlation does not equal causation (Schwartz, 1994). It is therefore impossible to know whether psychological distress leads to venting or vice versa, or if a third unknown variable impacts both levels of psychological distress and venting. Thus, as previously argued, there exists a gap in knowledge regarding how venting functions as a regulation strategy which may only be satisfactorily bridged via further experimental research.

5.5 Summary and Future Steps

Due to the lack of systematic empirical investigation, there are many outstanding questions related to venting. Existing research indicates that there may be a link between venting and emotion processes, however, the direction and mechanism of moderation are unclear. For example, while the results from the experimental and quasi-experimental studies (e.g. Nils & Rimé, 2012; Lee & Wu, 2015) indicate potential adaptive outcomes of venting, both studies were lacking in terms of methodological rigour and measurement practices, which renders causal understandings of venting as incomplete at best. Conversely, any evidence that venting produces maladaptive outcomes is limited to correlational work that does not fully disentangle the mechanism which leads to regulatory failure or the psychological distress caused by venting (see 5.5). Although I argue there is a clear link between emotion and venting, the literature has yet to research the structure and outcomes of these processes more concretely. Hence, there is a gap in our knowledge concerning the function, processes, and outcomes of venting due to the unconvincing evidence base available.

Most importantly, the literature needs experimental designs in which the regulatory mechanism of venting, from emotion elicitation to regulation, is empirically tested. These experiments would involve participants having an emotion induced within laboratory conditions. The emotion elicitation procedure should result in measurable changes to subjective experiential and autonomic nervous system functioning – two core components of an emotion event (see 1.1). Consequently, participants should undertake actual verbal venting behaviours, as opposed to imagining the process, which should further observably impact the aforementioned emotion components. So far no studies have been reported that fully present this process and some of the basic questions about venting use remain unanswered.

5.6 The Current Study

Based on the previously outlined knowledge gaps, this study aimed to establish whether venting adaptively regulates emotions elicited by an everyday stressor in non-clinical populations (see Chapter Four for discussion on methodology). As discussed above, quantitative research into verbal venting has thus far been limited, with the available literature epitomised by questionable measurement practices and cross-sectional designs. The lasting legacy of this has ensured that scientific understandings of some of the basic questions relating to venting are yet to be answered. Chapter Two explored participants' perceptions of venting, which informed the design and operationalisation of the present study. Because venting is a behaviour reportedly used by over 90% of participants in Study One of the present thesis but has had little systematic, theoretically-informed exploratory attention, it is, therefore, pertinent to explicate whether and how venting moderates state emotion. This is of particular importance when considering the correlational evidence that venting may increase psychological distress or reduce an individual's ability to self-regulate (see 5.5). Indeed, if the reader assumes that the findings from Study One generalise to the wider population – that is the majority of non-clinical adults engage in venting behaviours – then venting must be systematically investigated to assess whether it truly has the potential for precipitating deleterious outcomes or whether, as indicated in Study One, venting provides adaptive functions which improve psychological wellbeing.

To this end, the present chapter aimed to examine how venting impacts experimentally elicited state emotion compared to not venting, as evidenced by changes to self-reported state emotion and the psychobiological measure of heart rate variability (HRV; see 4.4.2). To do this, a negative emotion was elicited through Cyberball gameplay (Williams & Jarvis, 2006; see 4.7). Cyberball was selected as it has been well evidenced as a reliable form of emotion induction (see 4.4.1). Subsequently, participants were asked to read a script aloud which contains phrases associated with venting or a description of the laboratory room. While it is recognised that by standardising the procedure, that is by asking participants to read from a script rather than being directed to freely express their feelings associated with Cyberball gameplay, the study may lose contextual features which are influential to venting's efficacy, by removing any potential confounds of contextual or interpersonal affordances (e.g., depth of relationship, social status, etc.), the present study aims to assess whether venting may provide adaptive functions in response to a stressor.

The data from Study One and the wider literature led to the first two hypotheses; that following the elicitation of social pain (see 4.7; Eisenberger, 2015), venting would increase (H1) general positive state emotion and (H2) self-assurance – an emotion characterised by feelings of confidence and boldness – as measured by the Positive and Negative Affect Schedule – Extended (PANAS-X; Watson & Clark, 1999; see 4.4.3). If venting provides avenues for retaining control and creating meaning from adversity (e.g. Burchard 2001; van Wijk & Dalla-Cia, 2016), changes in self-reported levels of these emotion populations should be observed. It was further hypothesised that venting would correspondingly decrease (H3) general negative state emotion and (H4) hostility – an emotion characterised by feelings of anger and aggression – as measured by the PANAS-X. The underlying rationale for including the hostility subscale in the analysis was based on previous work (Lee & Wu, 2015) which implied, through measurement of anger, that venting may influence levels of state anger and through participants' strong association of venting with anger in the qualitative study of the present thesis. If the perceptions that venting reduces anger and negative emotion, as described by participants in Study One, reflect actual regulatory processes, then this effect should be measurable within the present study. The final hypothesis is that, after venting, (H5) participants who vented would display increased HRV when compared to participants who did not vent as a by-product of parasympathetic nervous system dominance – a biomarker of adaptive self-regulation following psychological relevant stressors. Results for changes in heart rate are reported but no specific hypotheses were made related to heart rate change. Results for changes in HRV between baseline and during gameplay are reported, but no specific hypotheses were made as it is assumed that changes in HRV may be due to emotion elicitation and not regulation properties, and is thus beyond the scope of the present work.

5.7 Methodology

The present truncated methodology section outlines the specific deviations from the previously outlined general methodology (see Chapter Four) or points that bear repeating for clarity.

5.7.1 Design

A mixed design was employed with the independent variable being the script (venting [intervention], *n*=72; articulation [control], *n*=65). Participants were asked to recite out loud either a 'venting' script (intervention group; *n*=72), which is reading a script aloud that contained statements and phrases expressing anger, or a neutral 'articulation' script (control group; *n*=65), which is a script that contained statements and phrases describing the laboratory room.

The dependent variables were measures of heart rate variability (HRV) and self-reported state emotion (PANAS-X scores). HRV (baseline; ~5 minutes after the task was compared across time as both a within and between-subjects variable. PANAS-X scores were assessed as a between-subjects variable. Participants were randomly assigned to one of the conditions (see 4.3.1).

5.7.2 Participants

Since few prior studies have been conducted using venting as the independent variable, I was unsure about the anticipated effect size of the main effects of interest (i.e., the effect of venting on state emotion and heart rate variability [HRV]). However, pragmatically recruiting enough participants to detect a small effect size with 80% power in a between design study (*N*=3142) was beyond the means of the present work. Hence, two power analyses were conducted using GPower (Faul et al., 2007), assuming a medium effect size (*d*=0.5) with alpha set at 0.05, for PANAS-X (between) and HRV (mixed) analyses. Using a between design, assuming 80% power, this required a sample size of 128 participants. In contrast, using a mixed repeated measures design, assuming 80% power and default settings, a sample size of 28 participants was required. The present study aimed to recruit a larger sample (*N*=128) to ensure adequate power for all analyses.

The sample was drawn from the United Kingdom. In total, 140 participants were recruited to offset participant and data attrition. Three participants were excluded for disclosing current diagnoses of psychopathology. Therefore, 137 participants' (69.8% female, 28.1% BAME, *M*age=20.47 years, *SD*=4.29, range=18-53 years) data was included for analysis. For heart rate variability data analysis, 45 participants' electrocardiogram (ECG) data contained recurrent artefacts precluding analysis and were therefore excluded. Eight participants' data contained impossible values (e.g. 4000ms interbeat-intervals), likely derived from artefacts in the data processing stage, and were excluded. Therefore in HRV analyses, 83 participants' data were analysed for the present study. This sample size is consistent with prior work using HRV as the measure of interest (Laborde et al., 2017) and with the mixed design a priori power calculation.

5.7.3 Procedure

Participants were recruited from a potential UK based pool (see 4.1 for details). Prior to the start of the experiment, participants were randomly allocated into one of two experimental conditions (the independent variable): a venting condition vs. articulation (control) condition using the allocation concealment protocol previously outlined (4.3.1). Participants were welcomed and seated in a lab room. After informed consent was provided, participants were connected to a BIOPAC MP36 4-channel data acquisition system, programmed to collect electrocardiogram (ECG) data. Participants' ECG data were recorded throughout the experiment (see 4.4.2).

Participants then played a single game of Cyberball in which they were socially ostracised (see 2.5.2 and 4.4.1). In this game, participants received 10% of 30 total ball tosses throughout the game. All participants completed the fundamental needs questionnaire immediately after Cyberball gameplay; the responses to this measure served as a manipulation check to ensure that Cyberball induced subjective experiences of social pain.

At this point, participants in the venting condition (*n*=72) were presented with a script that contained phrases associated with venting, as identified through discussion with the supervisory team, and from empirical research outlining the role of venting. Participants were instructed to read the script aloud. As venting has been described in both mediums as a mechanism for the creation of meaning from adverse experiences, the venting script included phrases such as "Maybe they're friends and wanted to play together" and "Or maybe they didn't realise what they were doing, and it was an accident" to provide the opportunity for clarity to be gained by the participant. Venting is also largely associated with anger, and so participants engaged in affect labelling – a phenomenon where naming an emotion can allow for the subsequent regulation as clarity is gained regarding the experiential component of an emotion (Torre & Lieberman, 2018); as such the following was included in the script: “I am so angry at them”. Venting has similarly been conceptualised by participants in the qualitative study (see Chapter Three) as providing an avenue to express anger, as such phrases such as the following were included in the script: “I can’t believe they didn’t let me play in the game. How dare they?” In total, the venting script was 267 words long.

Conversely, participants in the articulation condition (*n*=65) were presented with a script that described the laboratory room in which the study was taking place within the university building. Participants were similarly asked to read this script aloud. The description script was a comparable length to the venting script, a total of 260 words. Example phrases from the description script are as follows: “the room I am sat in has plain, white walls”; “there are three filing cabinets pushed up against a wall”; and “The light is a long fluorescent light in the centre of the ceiling”. Both scripts were presented to participants on the computer screen and participants were asked to recite the scripts out loud. Finally, participants were asked to complete the dependent measures assessing state emotion and sample characteristics measures (see 4.4.3). After completion of the self-report measures, participants were debriefed and thanked for their time. As HRV and PANAS-X scores are not subjective measures, outcome assessors were not blinded.

5.7.4 Materials

The Fundamental Needs and Mood Questionnaire, the PANAS-X, HRV, and sample characteristics questionnaires were all used in the present study (see 4.4.).

5.7.5 Analysis

The fundamental needs and mood questionnaire and HRV data recorded during gameplay were used as a manipulation check for the Cyberball paradigm. For fundamental needs and mood questionnaire responses, a *t*-test was conducted to measure the difference between the mid-point of the scale and participant responses. Where responses fell significantly below the mid-point of the scale, the Cyberball paradigm is assumed to have elicited state social pain. For HRV data, a *t*-test assessed differences in HRV between baseline measures and during gameplay.

Following this check, the main analysis was conducted in two steps. Firstly, *t*-tests were conducted to assess any potential differences between self-reported levels of state emotion between the venting and articulation conditions. As the PANAS-X has a total of 13 (sub)scales, I aimed to reduce the probability of Type I/II errors by only analysing the GPA, GNA, hostility, and self-assurance PANAS-X scales/subscales initially. Where a significant effect is detected on either measure of GPA or GNA, the associated subscales would be analysed. Both scales of self-assurance and hostility were identified in the reviewed literature to be associated outcomes of venting, as such these subscales were selected for analysis alongside the GPA and GNA scales.

Secondly, mixed ANOVAs were performed to test whether there was an effect of experimental condition (between) on HRV when compared to baseline levels of HRV (within). As the current gold standard for short-term duration of HRV recording and analysis is 5-minutes (Laborde et al., 2017; Malik, 1996), the epochs of time analysed in the present work were baseline, 0-5 minutes and 5-10 minutes post task completion.

Sample characteristics, including demographic features and trait ER strategy use, were described using descriptive statistics. Independent samples *t*-tests were used to assess any potential differences between the experimental groups in alexithymia, difficulties in ER and habitual venting use.

The analyses were conducted using SPSS and JASP. Following Tabachnick and Fidell's (2007) guidance, responses ±3.5 SDs from the mean were identified as outliers. The main analyses were re-run without outliers. However, the findings from these analyses did not deviate from the findings reported herein and are not reported. Raw analytical output is available in Appendix P.

5.8 Results

5.8.1 Cyberball Manipulation Check

5.8.1.1 Fundamental Needs and Mood Questionnaire

To assess whether the social ostracism manipulation elicited negative state emotion, *t*-tests were performed between the average scores of the fundamental needs subscales and the mid-point of the response scale (Sleegers et al., 2017). Results showed that all subscales decreased from the midpoint (see Table 5.1) in a manner consistent with experiencing social pain. Cronbach's alpha was poor for all subscales which may suggest issues with internal validity of the needs threat subscales and reflect the poor factorial validity of the measure (see 4.4.3).

Table 5.1. Difference average Fundamental Needs and Mood Questionnaire scales from mid-point.

	Statistics				
Scale	*t*(136)	*p*	*M*	*SD*	*α*
Self-esteem	3.126	.002	2.34	0.62	.415
Belonging	11.038	<.001	1.87	0.67	.669
Control	12.418	<.001	1.81	0.65	.451
Meaning	3.936	<.001	2.25	0.74	-.064
Mood	12.401	<.001	36.39	12.85	.651

Note. M = Mean; *SD* = Standard deviation; *α* = Cronbach's alpha. Midpoint of Fundamental Needs subscales = 2.5. Midpoint of Mood subscale = 50.

5.8.1.2 Heart Rate Variability (HRV) and Heart Rate

Participants demonstrated a significant increase in root Mean Square of Successive Differences (rMSSD) HRV during Cyberball gameplay (*M*=3.85, *SD*=0.54) compared to baseline (*M*=3.75, *SD*=0.55), *t*(82)=3.025, *p*=.003, 95% CI[-0.168, -0.035], *dz*=0.26. In common language effect size terms (Daniël Lakens, 2013), the likelihood that RMSSD is higher during exclusionary gameplay than at baseline is 40.77%. Accordingly, there was also a significant increase in HF HRV during Cyberball gameplay (*M*=6.27, *SD*=0.96) compared to baseline (*M*=6.06, *SD*=1.02), *t*(82)=2.476, *p*=.015, 95% CI[-0.380, -0.041], *dz*=0.21. When converting *d* into common language effect sizes, this means that the likelihood that HR was higher during exclusionary gameplay than at baseline was 42.43%.

There were no significant differences observed in ratio of low-frequency to high frequency (LF/HF) HRV during Cyberball gameplay (*M*=1.18, *SD*=1.01) compared to baseline (*M*=1.24, *SD*=1.11), *t*(82)=0.731, *p*=.467, 95% CI[-0.112, 0.243], *dz*=0.05.

There was also a significant difference in heart rate (HR) between baseline (*M*=83.36, *SD*=10.08) and Cyberball gameplay (*M*=82.16, *SD*=9.51), *t*(82)=2.061, *p*=.042, 95% CI[0.041, 2.347], *dz*=0.18. The likelihood that HR is higher during exclusionary gameplay than at baseline was 56.46%.

5.8.2 Positive and Negative Affect Schedule – Extended (PANAS-X; Watson & Clark, 1999)

To test my hypothesis that venting would increase self-reported levels of general positive affect (GPA; H1) and self-assurance (H2) and decrease self-reported levels of general negative affect (GNA; H3) and hostility (H4), and, a series of independent samples t-tests were conducted to assess mean differences in PANAS-X responses. Descriptive statistics and correlations for each scale are reported in Table 5.2 and 5.3 respectively. The data is visualised in Figure 5.1.

A Pearson's correlation found a negative, but not significant, relationship between GNA and GPA scores, *N*=137, *r*=-0.65, *p*=.453 (see table 5.3). Furthermore, GNA scale scores were significantly, positively associated with responses on the Hostility subscale, and GPA scale scores positively and significantly correlated with self-assurance scale scores. These results suggest that participants did not report high generalised emotionality across both positively and negatively valenced affect labels, but rather the self-reported emotions were grouped by valence.

Table 5.2. Means (*M*) and standard deviations (*SD*) disaggregated by experimental group, and Cronbach's alpha (α) for PANAS-X (sub)scales

	Group				
	Venting (*n*=72)		Articulation (*n*=65)		
Scale	M	SD	M	SD	α
GNA	8.31	5.34	8.03	5.58	.68
Hostility	5.39	4.22	4.86	4.03	.71
GPA	8.92	6.60	7.45	6.05	.80
Self-assurance	5.90	3.96	4.78	3.28	.54

Table 5.3. Correlations (r) between PANAS-X (sub)scale responses.

	Scale		
Scale	Hostility	GPA	Self-Assurance
GNA	.737**	-.065	.017
Hostility		-.161	-.010
GPA			.718**

Note. *p<.05; **p<.01 *N*=137.

5.8.2.1 GPA

Levene's Test for Equality of Variances indicated that there was homogeneity of variance, F=0.120, p=.730. The results did not indicate a significant difference in self-reported levels of GPA between the experimental groups, $t(135)$=1.355, p=.178, 95% CI[-0.68, 3.62], d=0.232.

5.8.2.2 Self-Assurance

Levene's Test for Equality of Variances suggested that the assumption of homogeneity of variance had not been violated, F=1.160, p=.283. There was no significant difference in self-reported self-assurance between participants in the venting or articulation condition, t(135)=1.788, p=.076, 95% CI[-0.20, 2.36], d=0.306.

5.8.2.3 GNA

Levene's test indicated that there was homogeneity of variances between the venting and articulation groups, F=0.884, p=.349. The results from the frequentist analyses indicated that there was not a significant difference in self-reported levels of GNA between participants reciting either the articulation or venting script, t(135)=.294, p=.769, 95% CI[-1.57, 2.12], d=0.050.

5.8.2.4 Hostility

For the Hostility subscale, Levene's Test for Equality of Variances was not violated, F=0.70, p=.792, thus statistics relating to equal variances assumed are reported. The results indicated that there was no significant difference in the levels of self-reported Hostility between the articulation condition compared to participants in the venting condition, t(135)=.746, p=.457, 95% CI[-1.58, 2.13], d=0.128.

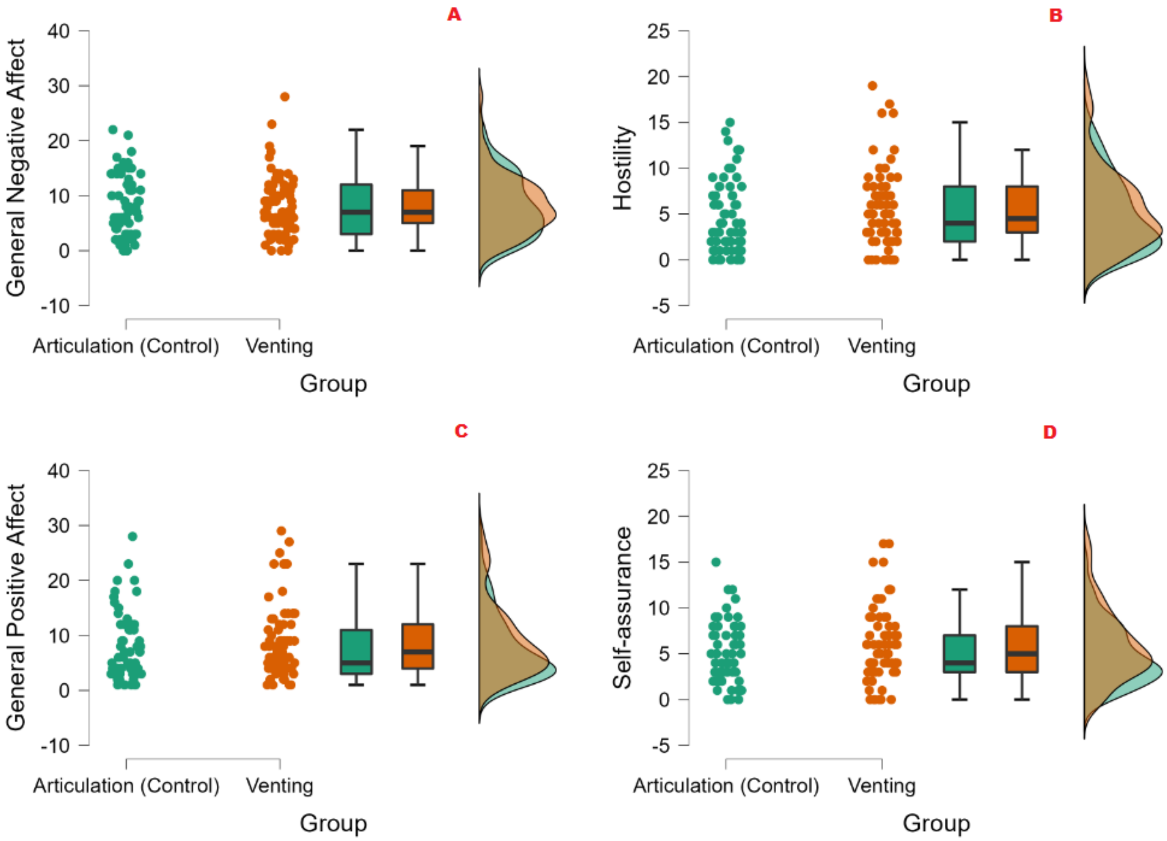


Figure 5.1. Responses to (A) GNA, (B) hostility, (C) GPA, and (D) self-assurance PANAS-X subscales presented as boxplots, indicating the median and quartiles with whiskers reaching up to 1.5 times the interquartile range. The density plot outlines illustrate kernel probability density, i.e. the width of the outlined area represents the proportion of the data located there. Individual data points are plotted in green (control) and orange (venting).

5.8.3 HRV

To test my hypothesis that venting would induce change on HRV, I explored the events immediately prior to (baseline) and following (0-5 minutes post-task; 5-10 minutes post-task) Cyberball gameplay. A series of 2x3 mixed ANOVA were conducted, with experimental condition (venting; articulation) set as the between-subjects condition and the time (baseline; 0-5 minutes post-task; 5-10 minutes post-task) as the within condition. In line with standard practice recommendations (see 4.4.2.2), the HRV parameters calculated were root mean standard successive differences (rMSSD), high-frequency absolute power (HF), and low-frequency/high-frequency ratio. Descriptive statistics for each parameter can be found in Tables 5.5 and 5.6. All values are within the norms of short-term (e.g. 5-minute epoch) HRV norms (see 4.4.2; Nunan et al., 2010; Shaffer & Ginsberg, 2017), except LF:HF whose log-transformed range falls below the average range expected for LF:HF indices. This difference is likely due to the averaging of HRV across baseline and post-experimental task epochs in the present study, as short-term HRV are only derived from baseline epochs.

As the HRV parameters demonstrated a non-normal distribution, in line with best practice recommendations (Laborde et al., 2017; Malik, 1996), a natural logarithm was applied to transform the data (see table 5.4 and 5.5 for absolute and log-transformed HRV values).

Table 5.4. Study overall mean and range of all HRV values in absolute and log-transformed values.

	Absolute Values				Log-Transformed Values			
Measure	*M*	*SD*	Med.	Range	*M*	*SD*	Med.	Range
rMSSD	52.01	30.38	44.21	20.14-3462.05	3.80	0.54	3.79	2.56-5.49
HF (ms^2)	711.11	686.11	461.34	20.14-3462.05	6.17	0.96	6.13	3.00-9.15
LF:HF	5.10	5.34	2.88	0.35-29.27	1.17	0.96	1.06	-1.06-3.38
HR	82.36	9.22	82.45	51.58-105.04	-	-	-	-

Note. rMSSD = Root mean square of successive differences; HF = High frequency HRV in milliseconds^2; LF:HF = Low-frequency:high frequency HRV ratio; HR = Heart rate; Med. = Median.

Table 5.5. Means (*M*) and standard deviations (*SD*) of natural log-transformed HRV parameters and untransformed heart rate disaggregated by experimental condition and analysed time epoch.

	Group							
	Venting (*n*=43)				Articulation (*n*=40)			
	RMSSD	HF	LF/HF	HR	RMSSD	HF	LF/HF	HR
Epoch	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Baseline	3.72 (0.55)	5.82 (1.02)	1.38 (1.16)	84.32 (10.04)	3.79 (0.56)	6.31 (0.96)	1.10 (1.04)	82.32 (10.03)
0-5 Mins	3.76 (0.50)	6.01 (0.97)	1.17 (0.98)	82.73 (9.16)	3.84 (0.54)	6.33 (0.83)	1.14 (0.65)	82.73 (9.16)
5-10 Mins	3.80 (0.51)	6.07 (1.03)	1.18 (1.00)	82.38 (8.67)	3.88 (0.56)	6.41 (0.78)	1.14 (0.87)	80.38 (8.67)

Note. Mins=Minutes; rMSSD=Root mean square of successive differences; HF=High frequency HRV absolute power; LF/HF=Low-frequency/high-frequency HRV ratio.

5.8.3.1 rMSSD

Mauchly's Test of Sphericity indicated that the assumption of Sphericity had been violated, $\chi 2(2)=35.094$, $p<0.001$, and therefore, a Greenhouse-Geisser correction was used. The results found a significant difference in rMSSD indices across time-points, $F(1.476, 119.548)=4.561$, $p=.021$, $\eta^2_p=0.021$. A posthoc pairwise comparisons found a significant increase between baseline and 5-10 minutes rMSSD indices, .046 (95% CI, 0.019 to 0.111), *p*=.011, and between 0-5 and 5-10 minutes post-task, .042 (95% CI, 0.005 to 0.080), *p*=.026. There was no evidence of a significant difference in rMSSD between baseline and the first five minutes after the task, -.046 (95% CI, -0.111 to 0.019), *p*=.161.

There were no significant differences between the experimental groups, $F(1,81)=0.561$, $p=.456$, $\eta^2_p=0.007$ for rMSSD HRV. Similarly, there was no evidence of a significant interaction effect, $F(1.476, 119.548)=0.058$, $p=.895$, $\eta^2_p=0.001$.

When taken together, these results suggest an increase in rMSSD after exclusionary gameplay. In the time immediately following Cyberball exclusion, rMSSD has been demonstrated to increase demonstrating recovery (Gulewitsch, Jusyte, Mazurak, Weimer, & Schönenberg, 2017), as such these findings may be explained by the manipulation.

5.8.3.2 HF

Mauchly's test suggests that the Sphericity assumption has been violated, $\chi2(2)=33.869$, $p<0.001$. A Greenhouse-Geisser correction was therefore applied. The differences between HF HRV across time, $F(1.487, 120.432)=2.501$, $p=.101$, $\eta^2_p=0.030$, were not significant.

The results found a significant difference in HF HRV between the groups, $F(1, 81)=4.190$, $p=.044$, $\eta^2_p=0.049$. Simple comparisons revealed that the venting group demonstrated significantly lower levels of HF HRV (*M*=5.97, *SD*=1.01) compared to the control group (*M*=6.35, *SD*=0.86), -.379 (95% CI, -0.747 to -0.011

There was no evidence of an interaction effect, *F*(1.487, 120.432)=0.689, *p*=.463, η^2_p=0.008.

As no interaction effects were found, I believe that it is likely that the demonstrated group effects are related to individual differences in the sample, rather than being due to the experimental paradigm.

5.8.3.3 LF/HF

Mauchley's Test of Sphericity was violated, $\chi 2(2)$=10.796, *p*=.005, therefore a Greenhouse-Geisser correction was applied. There was no evidence of a significant effect of time, *F*(1.776, 143.841)=0.635, *p*=.513, η^2_p=0.008, or group, *F*(1,81)=0.371, *p*=.544, η^2_p=0.005, on LF/HF HRV. There was also no significant interaction effect, *F*(1.776, 143.841)=1.379, *p*=.255, η^2_p=0.017.

The results indicate that it is unlikely an effect was available in the observed data based on either time, experimental group, or the interaction of these two models.

5.8.3.4 Heart Rate

Mauchly's Test of Sphericity indicated that the assumption of Sphericity had been violated, $\chi2(2)=61.844$, $p<0.001$, and therefore, a Greenhouse-Geisser correction was used. There was evidence of a significant effect of time on average heart rate, $F(1.300, 105.304)=9.337$, $p=.001$, $\eta^2_p=0.103$. A simple comparisons analysis indicated that average heart rate decreased significantly from baseline to 0-5 minutes post-task, 1.123 (95% CI, 0.265 to 1.981), $p=.011$, and from baseline to 5-10 minutes post-task, 1.676 (95% CI, 0.707 to 2.645), $p=.001$. There was also evidence of a significant difference in average heart rate between the 0-5 and 5-10 minutes post tasks, 0.553 (95% CI, 0.129 to 0.978), $p=.011$.

In contrast, there was no main effect of group on average heart rate, $F(1,81)=0.588$, $p=.445$, $\eta^2_p=0.007$, or for any interaction effects, $F(1.300, 105.304)=0.697$, $p=.442$, $\eta^2_p=0.009$.

These results suggest a deceleration of heart rate throughout gameplay. Exclusion Cyberball games have been demonstrated to lead to a decrease in HR (Begen & Turner-Cobb, 2015; Gunther Moor, Crone, & van der Molen, 2010; Iffland, Sansen, Catani, & Neuner, 2014), as such these findings may be explained by the manipulation.

5.8.4 Sample Characteristics

The data contained herein is only a partial dataset (*n*=98) due to unforeseen data loss (see 4.5.3).

5.8.4.1 Toronto Alexithymia Scale – 20-items

The independent samples *t*-test revealed no significant differences in levels of alexithymia between the venting group (*M*=54.64, *SD*=12.08) and the neutral word repetition group (*M*=52.07, *SD*=9.97), *t*(96)=-1.139, *p*=.257, *d*=.231. The results suggest that, on average, the sample do not suffer from alexithymia – values ≤51 are interpreted as non-alexithymia – as such it is assumed that the emotion elicitation procedure is unlikely to be impacted at a group level by participant difficulties in experiencing or understanding emotion.

5.8.4.2 Difficulties in Emotion Regulation

The independent samples *t*-test revealed no significant differences in self-reported difficulties in emotion regulation (DERS), as measured by DERS total scores, between the venting group (M=94.39, SD=24.91) and neutral script group (M=92.09, SD=25.41), $t(96)$=0.451, p=.653, d=.091. These results suggest that participants in both groups are equally skilled in regulating emotion.

5.8.4.3 COPE Inventory – Focus On and Venting of Emotions Subscale

The independent samples *t*-test revealed no significant differences in habitual venting of emotions, as measured by scores on the Venting subscale of the COPE Inventory, between the venting (M=10.57, SD=3.54) and the neutral script group (M=10.65, SD=3.48), $t(96)$=0.106, p=.916, d=.021. These results indicate that participants in both groups use behaviours that express, or *vent*, emotions similarly irrespective of experimental condition, and no habituation effects of venting should differentially impact either group.

5.9 Discussion

The previous qualitative study (Chapter Three) indicated that individuals believe that venting has the propensity to change one's emotional state. The research reported herein examined whether patterns in emotion component trajectories, specifically changes in subjective state emotion and psychophysiological correlates of HRV, after venting triangulate the subjective experiences described by participants in Study One.

The dearth of empirical literature manipulating and measuring the impact of venting has resulted in a lack of evidence-based, mechanistic models of venting phenomena. Rather, to date, comprehensive understandings are formulated from correlational work (see 5.3) which lacks concrete epistemological or theoretical frameworks. The present research, therefore, extended the available literature by using the theoretical framework of the PMER (Gross, 2015; see 1.3) to inform the study design and hypotheses. According to this model, if venting fulfilled emotion regulatory functions, there must be measurable outcomes on emotion response systems of either psychophysiology or subjective experience. Based on the results of the qualitative study, namely that venting allows the individual to return to an emotional equilibrium (see 3.4.3.4), it was hypothesised that such changes would be demonstrated by a reduction in negative emotion and an increase in positive emotion as measured by the PANAS-X (Watson & Clark, 1999), and an increase in HRV following a venting manipulation.

The discussion will cover both the PANAS-X and HRV results in turn.

5.9.1 PANAS-X

It was hypothesised that self-reported levels of (H1) general positive state emotion and (H2) self-assurance would increase, and self-reported levels of (H3) general negative state emotion and (H4) hostility would decrease after venting, compared to not venting. The findings demonstrated that venting did not induce changes to state emotion on any of the PANAS-X subscales when compared to not venting, thus affirming the null for all hypotheses. I believe the lack of effect can be explained through three main pathways: an actual lack of true effects on GNA, GPA, and hostility; potential missing mediator variables; and an ineffective emotion elicitation paradigm.

Firstly, the most obvious finding was that there was a lack of effect on state emotion by venting. That is, venting did not appear to up- or down-regulate subjective state emotion, compared to not venting. For emotions related to hostility, GNA, and GPA emotions, there was moderate evidence to suggest that the lack of effect is explainable as evidence of absence in the present data; it is, therefore, reasonable to suggest that venting did not up- or down-regulate state emotions for these emotion populations.

I believe that the lack of effect on GNA, GPA, and Hostility provides a significant contribution to the literature. Previous correlational evidence has firmly suggested that venting is maladaptive as it up-regulates or re-elicits goal incongruous (i.e. negatively valenced) emotions (see 5.4). This assumption has, arguably, coloured how venting is conceptualised and studied in the literature. In the few studies investigating verbal venting, only measures of negative emotion (Lee & Wu, 2015; Nils & Rimé, 2012) or negative outcomes (Brown et al., 2005) have been used. The present study is the first adequately powered study to experimentally manipulate verbal venting and the lack of a significant effect – while not in line with the study's hypotheses – may help inspire more nuanced investigations into venting which do not assume the automatic co-occurrence of negative or maladaptive outcomes.

The null finding in the present work stands contrary to findings from Nils and Rimé's (2012) research, which found that venting may, in some contexts, increase negative state emotion through rumination (see 5.2). It is notable, however, that their sample (N=89; n=22.25 per cell) only achieved 36% power to detect the obtained effect (f=0.243), meaning the results may be limited by their lack of statistical power. It is reasonable to suggest that the actual effects of venting may not have been accurately captured by Nils and Rimé (2012). Rather the lack of an effect found in the present study may provide a more holistic picture of actual venting processes and outcomes due to the achieved statistical power. The present study is the first study to experimentally manipulate venting with adequate statistical power, as indicated by an a priori power calculation (see 5.7.2), and using validated, theoretically informed measures of emotion. While the available results may not necessarily provide insight into how venting induces change to one's emotional state, it suggests that venting, operationalised in the current work as reading aloud from a script containing emotional or venting associated phrases (see 5.9.3 for discussion on validity of the paradigm), may not impact subjective experiential state emotion. That is, the subjective change may not be understood by individuals as changing one's feelings from 'angry' to 'joy', for example. Rather, as indicated in the qualitative study and Burchard's (2001; see 5.2) analysis, venting may instead increase feelings of control or allow for meaning to be made; outcomes which are arguably not measurable by an emotion measure. The lack of an effect does not, of course, negate the possibility that venting may influence these emotions however there is a plausible explanation as to why the current paradigm may not have detected a significant effect.

Secondly, for emotions related to self-assurance, such as confidence, there was no evidence of an effect. This is notable as both the qualitative enquiry and literature review (Burchard, 2001) found that venting may provide a sense of control or confidence, and there was no clear evidence whether the patterns of data were best understood as absence of evidence or evidence of absence. Within the present study, no specific measures of self-reported feelings of control were collected. Feelings of empowerment and control have been associated with bi-directionally providing catharsis from emotions (Barak et al., 2008). That is, increased appraisals of control are associated with greater levels of self-reported catharsis. As the view that catharsis was the primary outcome of venting was endorsed by participants in the qualitative study (Chapter Three), this may mean that the affective experience associated with venting may not be an emotion but may instead be associated with appraisals of power and control. There is abundant room for further progress in determining whether venting regulate emotion or another intrapersonal process.

Thirdly, it may be suggested that, without baseline measures of subjective state emotion, the present study is unable to measure change in emotional state. That is, without evidence of an individual's subjectively experienced state emotion before exclusionary

Cyberball gameplay, it is impossible to know whether Cyberball induced negative state emotion as measured by the PANAS-X. While this may be unlikely, especially as the Fundamental Needs and Mood questionnaire results evidenced that the manipulation was successful in inducing needs threat, this explanation of a lack of effect cannot be dismissed out of hand. This points to the need to use a positive or neutral emotion elicitation procedure before social exclusion and/or record baseline levels of emotion before social pain induction to systematically document and robustly attribute any effects to the intervention (see Study Four, Chapter Seven).

5.9.2 HRV

The results found that there were no significant differences in any of the HRV indices between the venting and control groups across time. Thus the hypothesis that venting would lead to a decrease in HRV indices (H3) was not supported. I suggest that the lack of the social aspect of venting may have precluded physiological synchrony, which in turn prevented any HRV effects from being present. It is noted that a lack of social dimension may also have affected self-reported levels of subjective state emotion, and this is discussed below in 5.9.3.

Physiological synchrony refers to the temporal correspondence of physiological systems between individuals (Helm et al., 2018; Jackson et al., 2018). There is converging evidence that during expressions of psychological distress – such as that which motivates venting behaviours - humans synchronise emotion associated physiological mechanisms when seeking and providing social support (Petrocchi & Cheli, 2019). Indeed, when high levels of social support are provided, physiological mechanisms are significantly more likely to synchronise between members of a dyad. For example, within psychotherapeutic relations between client and therapist, levels of physiological synchrony of electrodermal stimulation were significantly and positively correlated with the strength of the bond between the dyads, and with the level of emotion-focused work undertaken, in a sample of 31 clients over a series of 6 therapeutic sessions (Bar-Kalifa et al., 2019). It has been hypothesised that increased physiological synchrony may suggest coordination between group members during an activity, allowing for the subsequent regulation of cognitive processes for specific group members (Malmberg et al., 2019). It may be suggested that without social supportive or regulatory input, changes in physiological functioning may not be apparent between venting and non-venting groups. While the mechanisms fulfilled by physiological synchrony in social sharing situations remains to be elucidated, further research should explore the impact of social regulation on emotion associated physiological mechanisms during and after venting. Correspondingly, it is important to elucidate the underlying mechanisms, which extends to the dynamics of social relationships within dyads providing venting related support, which allow for venting associated ER to occur and be successful.

5.9.3 Limitations

As in all empirical work, there are limitations to this study that need to be highlighted. Within the present research, the paradigm occurred independently of social feedback or interaction. Prior literature has previously suggested that venting may usually occur in a social context (Burchard, 2001). The seeking of social support and instigation of venting behaviours has been theorised to be solely related to social processes, with regulatory efficacy governed by environmental affordances and group dynamics. Within the findings in Chapter Three, participants described how regulation strategies could be applied once the emotion was externalised through speech and that, at times, another individual was required to help model regulation implementation. Thus, it may be argued that the effects of venting on components of state emotion in the present study may not truly reflect the processes occurring in venting as a social interaction and thus the results may not truly reflect the consequences of venting in everyday life. However, within the qualitative study, venting was conceptualised by participants as both a social and independent behaviour. That is, while venting was largely described as occurring within social contexts, some participants in the qualitative chapter indicated that venting could occur unaccompanied. This may mean that the efficacy of the behaviour is governed by the social context (or lack thereof). The present study aimed to standardise venting by removing the potential confounds of social processes while using the findings from the qualitative study – that venting may occur and be effective as an intrapersonal behaviour – leading to the paradigm used for the study.

Notwithstanding this limitation, the results provide the first high powered insight into venting mechanisms which may serve to inform future research, including extending programs into intrapersonal venting. For example, future research may wish to explore whether venting influences emotion components in groups who verbally vent to a voicemail compared to a silent confederate over the phone. An interaction with a silent confederate would preclude uncontrollable confounds, such as social communication (e.g., head nodding, smiling), but could fulfil the minimum requirements for social interaction (e.g., a human audience). If such a study found that the social interaction yielded an effect on the dependent variables (e.g., HRV) compared to the control (i.e. voicemail) condition, these hypothetical results would be supported by the results of the present study; demonstrating that the social aspect of venting is integral to the efficacy.

Moreover, the venting script – while facilitating a standardised mechanism through which the elicited emotion could be verbally vented – may lack external validity in that it may not reflect each individual's way of venting. The research team had concerns that by providing the opportunity for free form verbal expression after Cyberball gameplay in the venting condition, the instructions may lack clarity in interpretation across participants. That is, different participants may interpret the instructions differently. Such a confound may have led to ambiguous results and the verbalisation of more ruminative, rather than meaning-making, strategies. The team also had concerns, as discussed in 5.2, that a lack of standardisation would not provide a base from which a model of venting could be derived. As this study is the first to apply explicit ER strategies, such as meaning-making, to expressive speech-based venting, this work may provide a methodological springboard from which further research can be conducted. For example, future work may explore differences in both the face validity of instructions for, and emotion component trajectories following, freeform verbal venting compared to standardised venting tasks (i.e. script based).

5.9.5 Conclusions

The present research has provided empirical evidence which may help answer some of the basic questions related to venting's influence on state emotion. The results found that verbal venting did not elicit either a negatively valenced state emotion or anger following social exclusion. This finding, that venting did not serve as a rumination or maladaptive mechanism, stands in contrast to hypotheses made in the majority of published work (see 5.4), and should not be neglected. The present study is only the second, to my knowledge, to experimentally manipulate and document such a lack of effect and the first study to do so in an adequately powered paradigm. Such a lack of finding may have important implications for understanding why venting is a pervasive and popular behaviour. Historically, research investigating venting (see 5.3 and 5.4) has argued that venting propagates anger, hostility, or other adverse psychological outcomes. These findings have been used to suggest that venting is a wholly maladaptive mechanism, as the associated negative outcomes do not align with the agent's goal and actual affective state (Campos et al., 2011; D'Agostino et al., 2017b). There has, prior to the present study, been no research conducted to date which measures anger in studies exploring venting; rather proxies for anger – such as measures of desire to engage in hostile behaviour – have been used to measure emotion (e.g., Lee & Wu, 2015). As such, a much more nuanced account of venting function has arguably been derived when compared to the extant published findings.

5.9.6 Next Steps

The findings of the present study provide the following implications for the next empirical study (Chapter Seven). Firstly, to be able to fully attribute any changes in emotion response systems on social pain between the groups to speech-based ER, a positive emotion experience (i.e., inclusion Cyberball game) will be induced before social pain induction. Secondly, another speech-based ER technique (i.e., swearing) which was described in the qualitative study as being equally efficacious when used independently and within a social context will be employed.

In the chapter that follows (Chapter Six), I present the development and validation of a Dutch version of the PANAS-X. As the data collected for the next empirical study (Chapter Seven) occurred in the Netherlands, it is vital to have the same measure of subjective state emotion in the native language of participants. Thus, the analytical procedures and results in the translation of the PANAS-X into Dutch are described in the next chapter.

Chapter Six: Development and validation of a Dutch version of the Positive and Negative Affect Schedule - Extended (PANAS-XD)

As discussed in Chapter Two, part of the doctoral work included in the present thesis was undertaken in the Netherlands. The reasons why appropriate measures of emotion must be used in research have already been outlined (see Chapters One and Two). It is important to not only examine emotional experiences using measures capturing nuanced emotional experiences across the axes of valence and arousal, but also to measure emotions in a culturally and linguistically sensitive manner.

As discussed in Chapter One, according to the TCE (Barrett, 2017b), language is a fundamental element in emotion; an element that is constitutive of both experience and perception (Lindquist et al., 2015). The TCE suggests that language allows for the acquisition and subsequent substantiation of emotion conceptual knowledge, which in turn forms situated conceptualisations of affect (Borghi & Binkofski, 2014; Lindquist, 2013). Emotion conceptual knowledge is acquired and refined throughout development (E. C. Nook & Somerville, 2019). Both acquisition and refinement of concept knowledge is shaped by the social, linguistic and cultural context of the individual (Lindquist et al., 2015). Across generations within the same linguistic - and concomitantly cultural - context, language is theorised to structure and align emotion concepts and practices (Hoemann & Feldman Barrett, 2019). The available emotion linguistic terms in any given lexicon are unique and reflect each culture's specific, distinctive perspective on affective experiences (Wierzbicka, 1995). Thus, when measuring state affect in cross-cultural samples, it is critical to ensure that accurate representation of the emotion concepts being investigated occurs to collect reliable data (Spielberger, 2006).

As the collection of quantitative studies contained in the present thesis rely on the PANAS-X (Watson & Clark, 1999) as a primary outcome measure and the data were going to include Dutch speakers, it is essential to have a Dutch translation of the PANAS-X available. However, before the present validation study, no such translation existed. This research aimed to translate, adapt, and validate the psychometric properties of a Dutch version of the PANAS-X (PANAS-XD) to assess momentary state emotion in Dutch native speakers. The contribution of measure development and validation extends beyond the current work; the validation of PANAS-XD scales is of interest for research in the Netherlands, as well as for cross-cultural research (Cha et al., 2007). By increasing the range of languages in which emotions can be measured extending beyond the bipolarity of positive and negative affect, further cross-cultural comparisons can be made. Hence, the present study provides a substantial contribution to the literature by providing a robust and validated measure of state emotion within Dutch native speakers.

The present chapter will document the development and validation of a Dutch version of the Positive and Negative Affect Schedule – Extended (PANAS-XD). In the literature review, I will discuss the history of the PANAS-X as a measure (6.1). The PANAS-X has previously been translated into German (Grühn et al., 2010), Romanian (Cotigă, 2012), and Portuguese (Costa et al., 2020b). The current study has used these studies to inform methodological and analytical decisions in the validation process. The following section outlines these decisions and the supporting rationale or evidence. Thus, the approach to developing and validating the present measure will be presented, including the theoretical underpinnings of analytical decisions (6.2).

6.1.1 Translation and Validation Approach

The approach taken to translating and validating the PANAS-X into Dutch followed guidelines provided by Tsang and colleagues (2017). In precis (see 6.3.3), I convened an expert committee of native Dutch and English speakers. The PANAS-XD was forward translated – that is, translated from English to Dutch – and the translation was assessed by the expert committee for errors. The PANAS-XD was then back-translated – that is, translated from Dutch to English – and further reviewed by the committee for accuracy and conceptual equivalence between translations. A prefinal version of the PANAS-XD was produced by the expert committee after reviewing the forward and back translations and was assessed for semantic, idiomatic, experiential, and conceptual equivalence. Any discrepancies were resolved at this stage and all members of the committee reached consensus on all items of the prefinal version. The prefinal version of the PANAS-XD was pilot tested twice, and reviewed by the committee each time for accuracy and amended where required. After pilot testing and review, the final PANAS-XD was administered to a sample of 130 Dutch native speakers for validation. The collected data were then subject to tests of initial, construct, convergent, discriminant, and divergent validity (see Figure 6.1 for details). Details relating to initial, construct, and divergent validity are discussed below.

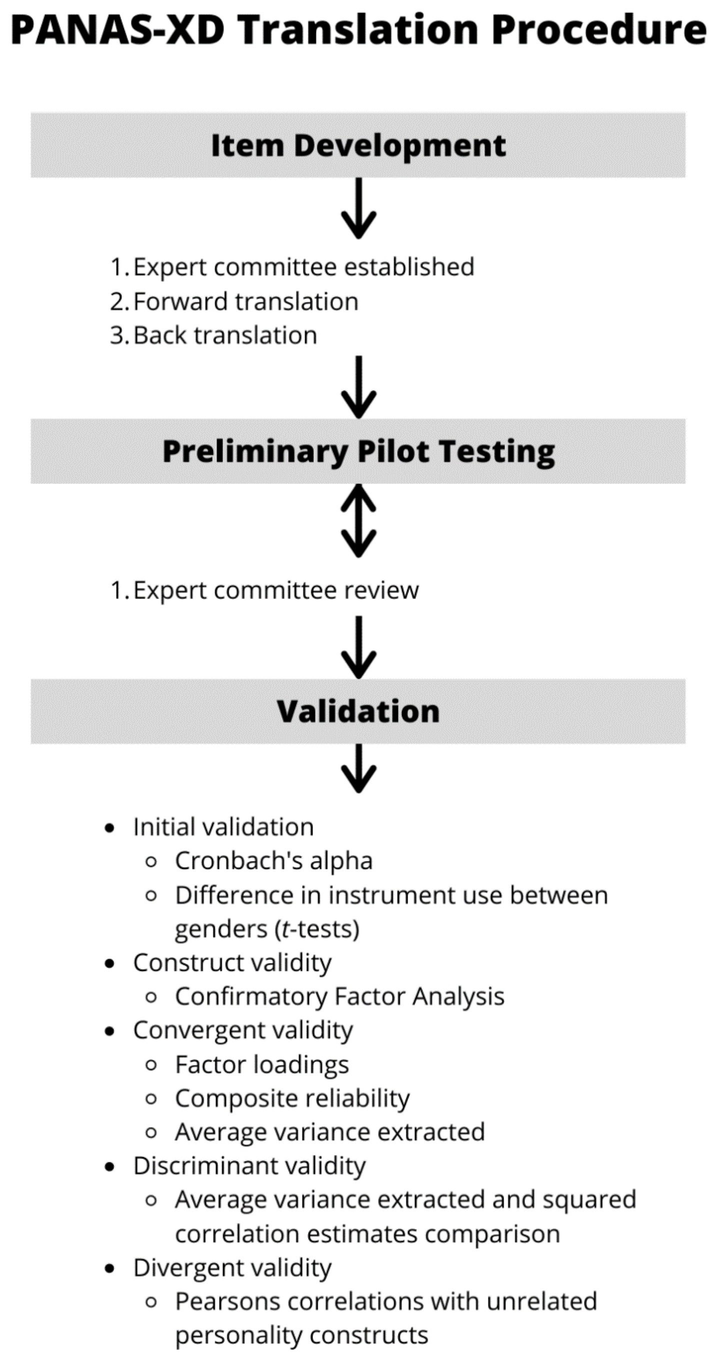


Figure 6.1. The translation and validation procedure of the PANAS-XD, as informed by Tsang et al., (2017).

6.1.1.1 Initial validation

I will assess the internal consistency and reliability of the PANAS-XD data collected for this study (*N*=120) using Cronbach's alpha. As previously discussed (see 4.4.3), the original PANAS-X demonstrated good internal consistency on the positive emotion and negative emotion scales (Watson & Clark, 1999).

The reliability and validity of the PANAS-XD will be further estimated through comparing the difference in mean scale scores between the gendered groups of male and female. Prior validation of the original and translations of the PANAS-X demonstrated few consistent gender effects in affective experience. It is worth noting, however, that three scales on the original version of the PANAS-X yielded gender effects; specifically, there were gender differences between males and females for the subscales of serenity (d=0.145), self-assuredness (d=0.44), and hostility (d=0.311). While these differences were statistically significant, the absolute effect size was small. Moreover, there were no gender differences found in either the German (Grühn et al., 2010) or Romanian (Cotigă, 2012) translation of the PANAS-X.

The lack of consistent gender differences in PANAS-X responses may be explained by the gender similarities hypothesis (MacGeorge et al., 2004). The gender similarities hypothesis holds that males and females are alike on most psychological variables, and that, in terms of effect sizes, any evident gender differences are in the close-to-zero ($d \leq 0.10$) or small ($0.11<d<0.35$) range – with a few in the moderate range ($0.36<d< 0.65$; Hyde, 2005). As differences in emotional experience have been found to be small or, in many cases, trivial (MacGeorge et al., 2004), it is expected that the PANAS-XD will demonstrate largely invariant differences between the genders as found in previous translations of the PANAS-X.

6.1.1.2 Construct Validity

Confirmatory factor analysis (CFA) is used as a measure of construct validity to elaborate and compare three models that were consistent with previous research with the PANAS-X. CFA techniques aim to examine the covariance structure of a series of variables and explain the interrelationships among the variables in terms of a number of smaller latent variables, known as factors (Stapleton, 1997). CFA is used when the researcher has a priori evidence from which to form a hypothesis about the number of latent variables (Byrne, 2016). By using empirical knowledge, the researcher can test the relationships between observed and latent variables, and subsequently assess the associated hypotheses. When using CFA, the significance of each parameter for a hypothesised model and the goodness-of-fit of the data to the model can be assessed, allowing for inferences about the model's validity to be made (Schumacker & Lomax, 2004). Thus, in the current study, CFA allowed for the testing of the theoretical framework of positive and negative affect which underpins the PANAS-X (Stevens, 1992). If a similar factor structure to that of the original PANAS-X is evidenced, this will further provide evidence for the PANAS-XD's construct validity.

It is worth noting that previous factor analyses of both the original version (Watson & Clark, 1999) and all translations of the PANAS-X (Costa et al., 2020; Cotigă, 2012; Grühn et al., 2010) do not demonstrate a good fit to either a one- or two-factor model. As such, the current study aims to assess the goodness-of-fit of the current data to a series of models to assess which best explains the underlying factor structure of the PANAS-XD and then to compare the yielded factor structure to that of the PANAS-X for validation purposes. CFA allows the assessment of statistical fit in relation to models that invoke different a priori assumptions, in this instance about emotion bipolarity and independence.

Watson and Clark (1999) suggested that the PANAS-X could be structured following a one-, two- (positive affect: joviality, self-assurance, attentiveness, serenity, and surprise; negative affect: fear, sadness, guilt, hostility, shyness, and fatigue) or a three-factor (positive affect: joviality, self-assurance, and attentiveness; negative affect: fear, sadness, guilt, and hostility; other affect: serenity, surprise, fatigue, and shyness) model. In the present CFA analysis, Model (1) is a one-factor model with all observed variables converging on a single latent factor of emotion. In Model (2), the items are grouped into two-factors of positive emotion and negative emotion. In Model (3), the items are grouped in three-factors of positive, negative, and other emotion. By using CFA, it is also possible to estimate the correlation between hypothesised latent factors, thereby allowing for the effect of random measurement error to be removed. Measurement error has previously been attributed to concealing evidence, or lack thereof, of a relationship between PA and NA in emotion research (Green et al., 1993). It is, therefore, important to consider both systematic and random variation when testing relationships between latent factors – especially when the latent factors relate to mood measurement.

6.1.1.3 Divergent Validity

Divergent validity is calculated through correlation analyses between the PANAS-XD and personality traits as measured by the Dutch translation of the Big Five Index (Denissen et al., 2008). Personality dimensions have been found to influence state and trait affect as measured by the PANAS-X (Watson & Clark, 1999). It may therefore be suggested that relationships between personality traits and momentary emotional experiences may help further validate the PANAS-XD.

It is hypothesised that, in line with the original PANAS-X, scores across GNA, Guilty, Hostility, Sadness, Shyness, and Fatigue will correlate positively with Neuroticism (H1). Conversely, GPA and Self-Assuredness will demonstrate a negative correlation (H2); GPA, Joviality, Surprise, Self-Assuredness, Attentiveness, and Serenity will positively correlate with Extraversion (H3), while Attentiveness will correlate positively with conscientiousness (H4), Hostility will correlate negatively with agreeableness (H5), and Self-assurance will positively correlate with agreeableness (H6).

6.1.2 Aims

The purpose of this study is to translate and validate the PANAS-XD. More specifically, the objectives of this study are the following: (1) to translate the PANAS-X into Dutch for use in experimental research; (2) to validate the construct validity of the PANAS-XD, using CFA techniques; (3) to assess internal consistency, convergent-, and discriminant validity of the PANAS-XD; and (4) to evaluate divergent validity of the PANAS-XD with the personality constructs of neuroticism, extraversion, conscientiousness, and agreeableness. As the present work is a validation study, a similar pattern of correlations to those outlined above are expected.

6.2 Method

6.2.1 Participants

The minimum number of participants required for the present study was estimated based on the sample from a previous translation and validations of the PANAS-X (*N*=120; Cotigă, 2012). In total, 130 participants were recruited for the present study via Prolific. Internet studies offer an efficient way of recruiting large, heterogenous samples which demonstrate equivalent representative characteristics to convenience samples usually employed in psychological research (Gosling et al., 2004). For the present study, the inclusion criterion was speaking Dutch as a first language; the exclusion criterion was the failure to accurately complete attention checks. Ten participants were excluded at the data analysis stage; 7 participants were excluded for failing the attention check, and 3 participants were excluded for speaking Dutch as a second language. The remaining sample put forward for analysis consisted of 120 individuals. Participant ages ranged between 18-49 years, with the mean age being 27.01 (SD=7.58). Forty-two participants were female, 76 participants were male, and 2 participants were non-binary. This is the first study validating a version of the PANAS-X in non-binary individuals and, irrespective of the small sample, analyses undertaken with non-binary participant data should be viewed as exploratory. The proportion of the sample reporting to be from a Black and Asian minority ethnic background was 8.3%.

6.2.2 Materials

6.2.2.1 Positive and Negative Affect Schedule - Extended

The Positive and Negative Affect Schedule – Extended (PANAS-X) is a 60-item self-report measure of 13 emotional states: GNA; GPA; Fear; Sadness; Guilt; Hostility; Shyness; Fatigue; Surprise; Joviality; Self-assurance; Attentiveness; and Serenity. Participants were asked to rate on a five-point scale the extent to which they experienced each item: (0) Nauwelijks of nhelemaal niet (*very slightly or not at all*); (1) Een beetje (*a little*); (2) Gemiddeld (*moderately*); (3) Nogal (*quite a bit*); and (4) In sterke mate (*extremely*), with higher scores on each subscale being indicative of greater levels of that specific state affect. Examples of the general negative affect subscale items are: 'vijandig' (*hostile*) and 'bang' (*afraid*; the translation procedure is outlined below). Examples of the general positive affect subscale items are: 'trots' (*proud*) and 'opgewonden' (*excited*). Subscale scores were obtained by summing item scores for a given subscale.

6.2.2.2 The Dutch Big Five Inventory

The Dutch Big Five Inventory (BFI; Denissen, et al., 2008) is a short instrument designed to measure the Big Five factors of personality in Dutch. The Dutch BFI is a 44-item self-report measure which assesses levels of respondent trait extraversion (e.g. 'Hartelijk, een gezelschapsmens is' [*is outgoing, sociable*]), neuroticism (e.g. 'Zich veel zorgen maakt' [*worries a lot*]), conscientiousness (e.g. 'Grondig te werk gaat' [*does a thorough job*]), agreeableness (e.g. 'Graag samenwerkt met anderen' [*likes to cooperate with others*]), and openness to experience (e.g. 'Benieuwd is naar veel verschillende dingen' *[is curious about many different things*]) on a 5-point scale anchored at (1) niet van toepassing (*disagree strongly*) and (5) zeer van toepassing (*agree strongly*; Denissen, et al., 2008; John & Srivastava, 1999). Scores across all items are averaged to provide a mean score for each trait, with possible scores ranging from 0-5. Internal consistency for each subscale for this study was satisfactory (Robertson & Evans, 2020; Taber, 2018), with Cronbach's α ranging from 0.64-0.81 (see Table 6.1 below).

Table 6.1. Cronbach's Coefficient Alpha statistics for the Dutch Big Five Index in the current study

Subscale	Cronbach's Alpha	95% Confidence Intervals

		Lower Bound	Upper Bound
Neuroticism	0.71	0.63	0.79
Extraversion	0.78	0.72	0.84
Openness to Experience	0.68	0.59	0.77
Conscientiousness	0.81	0.76	0.86
Agreeableness	0.64	0.55	0.74

6.2.3 Procedure

The translation of the Dutch version of the Positive and Negative Affect Schedule - Extended (PANAS-XD) was completed in four steps: (1) cultural forward translation; (2) back-translation; (3) expert committee meeting; and (4) preliminary pilot testing phase. All items were translated using 'de-centring', a process that involves the modification of words or phrases to maintain conceptual equivalence between the original and translated items (Hambleton, 1993). The first phase of cultural forward translation was completed by an independent, naïve Dutch native-speaking translator who was unaware of the objective of the PANAS-X or PANAS-XD. The translation was assessed by three Dutch native speaking members of the research team who discussed and resolved any discrepancies in the translation. The second phase of back-translation was completed by an independent, naïve English native-speaking translator who was also unaware of the objective of the PANAS-X or PANAS-XD. The third phase of the expert committee meeting consisted of four members of the research team, three of whom were native Dutch speakers fluent in English and one who was a native English speaker, reviewing all versions of the translations and determining whether conceptual equivalence had been reached between translations. Members of the expert committee reached a consensus on all items to form a PANAS-XD ready for pilot testing.

In the preliminary pilot testing phase, the PANAS-XD was then administered to a small group of participants (*N*=29) to identify any difficulty in understanding item content or the instruction. Respondents were asked to report back to the research team about their experiences completing the PANAS-XD. Responses revealed that the translated PANAS-XD, including questions posed, contained some spelling and grammatical errors, which were reviewed and rectified by the expert committee.

Following the initial pilot testing, the PANAS-XD was further pilot tested with a small group of participants (N=50). Responses revealed that the translated PANAS-XD was free from item ambiguity, and there was no evidence of difficulty in understanding the instructions or meaning of items. Thus, the final PANAS-XD was administered to the final sample (*N*=130) to examine the psychometric properties of the questionnaire see Table 6.3 for item composition of the PANAS-XD).

Participants completed a short demographics questionnaire recording age, gender, native language, and ethnicity. Following this, participants completed the PANAS-XD and the Dutch BFI. After completing the primary measures, participants were debriefed by an online information sheet and thanked for their time.

6.2.4 Analysis

The reproducible workflow, including data and code, is available on Github (https://github.com/Psychollygy/PANAS-XD) and in Appendix Q. The main analysis was conducted in three steps. Firstly, a series of independent samples *t*-tests were conducted to assess any differences in self-reported levels of state emotion between individuals who self-identify as male and those as female, as measured by the PANAS-XD. The original PANAS-X scale demonstrated few consistent gender effects; however, individuals who identify as male report higher rates of self-assurance, hostility, and serenity compared to those who identify as female (Watson & Clark, 1999). According to Watson and Clark (1999, p.13), these effects were “quite small”, however, no effect sizes were reported. As the authors concluded that there are unlikely to be any gender differences in the experience

Table 6.3. Item Composition of the PANAS-XD Scales.

General Dimensions	
Negative Affect (10)	Angstig (afraid), bang (scared), nerveus (nervous), gejaagd (jittery), schuldig (guilty), beschaamd (ashamed), geïrriteerd (irritable), vijandig (hostile), overstuur (upset), diep ongelukkig (distressed)
Positive Affect (10)	Actief (active), alert (alert), oplettend (attentive), enthousiast (enthusiastic), opgewekt (excited), geïnspireerd (inspired), geïnteresseerd (interested), trots (proud), sterk (strong), vastberaden (determined)
Basic Negative Emotions	
Fear (6)	Angstig (afraid), bang (scared), verschrikt (frightened), nerveus (nervous), gejaagd (jittery), onzeker (shaky)
Hostility (6)	Boos (angry), geïrriteerd (irritable), vijandig (hostile), minachtend (scornful), walging (disgusted), minachting (loathing)
Guilt (6)	schuldig (guilty), beschaamd (ashamed), afkeurenswaardig (blameworthy), boos op mezelf (angry at self), walg van mijzelf (disgusted with self), ontevreden over mezelf (dissatisfied with self)
Sadness (5)	Verdrietig (sad), treurig (blue), neergeslagen (downhearted), alleen (alone), eenzaam (lonely)
Shyness (4)	Verlegen (shy), bedeesd (bashful), schaapachtig (sheepish), timide (timid)
Fatigue (4)	Slaperig (sleepy), moe (tired), traag (sluggish), soezerig (drowsy)

Basic Positive Emotions	
Joviality (8)	Opgewekt (cheerful), blij (happy), vrolijk (joyful), verheugd (delighted), enthousiast (enthusiastic), opgewonden (excited), levendig (lively), energiek (energetic)
Self-Assuredness (6)	Trots (proud), sterk (strong), zelfverzekerd (confident), brutaal (bold), onbevreesd (fearless), gedurfd (daring)
Attentiveness (4)	Alert (alert), oplettend (attentive), geconcentreerd (concentrating), vastberaden (determined)
Serenity (3)	Kalm (calm), ontspannen (relaxed), op mijn gemak (at ease)
Surprise (3)	Verrast (surprised), versteld staan (amazed), verwonderd (astonished)

Note: In the left column, the number of items comprising each scale is reported in parentheses.

of emotion (see 6.2), it was predicted that there would be no significant gender effects. To assess the present power to detect any gender effects, an achieved power analysis was conducted using GPower (Faul et al., 2007). The analysis indicated that the current study achieved 65% power to detect a medium effect size, and 98% power to detect a large effect size.

Secondly, a series of confirmatory factor analyses (CFAs) were run to identify the most appropriate factor structure of the PANAS-XD. CFAs allow for the confirmation of a proposed factor structure in line with theoretical frameworks in comparison to other possible models. That is, it allows the researcher to assess whether the data are consistent with a hypothesised latent factor structure (Tinsley & Tinsley, 1987). Data were analysed using a variance-covariance matrix using Robust Maximum Likelihood (RML) estimation. Maximum Likelihood estimations assume that the observed variables follow a multivariate normal distribution (Beauducel & Herzberg, 2006). Where this assumption is violated, there is an increased chance of Type I error, where significant results are found and the null hypothesis is rejected when the findings occurred by chance (Parsons et al., 2022). Within the present sample, the normality assumption is moderately violated in some of the NA subscales (see Table 6.2 for statistics), hence RML has been employed as it is an asymptotically distribution-free method, meaning it is less dependent on the assumption of normality, ensuring that results are less likely to be inflated by increased Type I error.

Table 6.2. Skew and kurtosis of the PANAS-XD subscales

Subscale	Skew	Kurtosis
General Negative Affect	1.89	3.69
Fear	1.67	3.30
Sadness	1.42	1.739
Guilt	2.11	4.52
Hostility	1.69	2.81
Shyness	0.71	0.15

Fatigue	0.22	-0.69
General Positive Affect	0.08	-0.40
Joviality	0.02	-0.73
Self-Assurance	0.22	-0.57
Attentiveness	-0.35	-0.22
Serenity	-0.59	-0.15
Surprise	1.34	1.36

As it has been suggested that it is the combination of rejecting competing models and failing to reject a model which provides the most insight into the dimensionality of the construct of study (Bandalos et al., 2010), the dimensional structure of the PANAS-XD was tested through three competing models: Model (1) one-factor model, a Model (2) two-factor model, and a Model (3) three-factor model. It is predicted that the PANAS-XD will be underpinned by a two-factor structure with PA and NA constituting the latent factors. In the current analysis the PANAS-XD was tested against three models as, without testing alternative models, it is unclear whether significant correlations are the result of factors measuring the same construct (McGartland Rubio et al., 2001).

In all models, model goodness-of-fit was examined by the following indices: the ratio of chi-square to degrees of freedom (χ^2/df) as less than 3 (Kline, 2011), Root Mean Square of Approximation (RMSEA) ≤ 0.08, Comparative Fit Index (CFI) ≥ 0.90 (Browne & Cudeck, 1993), and the Standardised Root Mean Square Residual (SRMR) <.08 (Hu & Bentler, 1999) using the RML method. All models were subject to data bootstrapping. Data bootstrapping reproduces multiple subsamples from a given dataset and creates bootstrap estimates and standard errors. Bootstrapping is used to indicate the stability of the sample statistic as a representation of the whole population (Byrne, 2016). This procedure simulates a requested number of samples (in this case 2000) and investigates how well the hypothesised model would fit these samples. Based on the non-normal data, Bollen-Stine (1992) non-parametric bootstrapping was conducted with RML to test the null hypotheses that the model is correct. Where the null hypothesis is correct, as indicated by non-significant a *p*-value, the model is accepted. Rejection of the null hypothesis suggests that the model fits the actual sample poorly. The model which demonstrated the best fit, as indicated by goodness-of-fit indices, would further be assessed for convergent, discriminant, and external validity to best document the reliability of the PANAS-XD.

While it is recognised that a multigroup confirmatory invariance analysis – that is, the constraining and comparing of restricted models between groups (Schmitt & Kuljanin, 2008) – would allow for the measuring of variance to specific elements of the measurement structure between demographic groups (e.g., gender), due to constraints inherent to doctoral study (e.g., financial) the present study did not recruit the required sample size to adequately power such an analysis and the available groupings are unequal in size (male *n*=65, female *n*=35). According to Kline (2011), a minimum of 100 participants per group is required for multigroup invariance analyses (e.g., male *n*=100, female *n*=100). However, a total of *N*=130 participants were recruited, of which 120 participants' data were included for analysis. As such, the present work does not contain invariance testing. This is not seen as a detriment to the validity checking of the PANAS-X due to the documented lack of gender effect in PANAS-XD responses in all but one subscale.

After the CFA, the divergent validity of the PANAS-XD was estimated through a series of Pearson product-moment correlations. These were run to determine whether a relationship existed between the subscales on the PANAS-XD and the subscales of the Dutch BFI. The use of such correlations in validating the PANAS-XD was informed by the original (Watson & Clark, 1999) and Romanian (Cotigă, 2012) translations of the PANAS-X (see 6.2 for discussion).

As participants were required to complete all items on the survey platform, there was no missing data. Following Tabachnick and colleagues' (2007) guidance, responses ±3.5 SDs from the mean were identified as outliers. The main analyses were re-run without outliers. However, the findings from these analyses did not deviate from the findings reported herein and are not reported. All analyses and simulations were conducted using the lavaan and lavaanPlot packages in R (Rosseel, 2012; Team, 2016).

6.3 Results

6.3.1 Descriptive Statistics and Internal Reliabilities

Table 6.4 reports basic descriptive statistics and internal consistency reliabilities (Cronbach's coefficient alpha; Cronbach, 1951) for the PANAS-XD scales. The GNA scale had excellent internal consistency, with a Cronbach's alpha statistic of 0.92. Similarly, the GPA scale was reliable with a Cronbach's alpha statistic of 0.89. The further subscales had Cronbach's alpha statistics ranging from 0.67 to 0.93, indicating that the measure has satisfactory internal consistency (Taber, 2018). The internal consistency reliabilities have comparable corresponding values for the scales in the original PANAS-X, except for Shyness which demonstrated an alpha coefficient of 0.67 compared with the original 0.80, but remains within satisfactory levels. Scale correlations are shown in Table 6.5.

Table 6.4. Means, Standard Deviations (SDs), and Cronbach's Coefficient Alpha statistics for th scales of the Dutch Version of the Positive and Negative Affect Schedule – Extended

Subscale	Means	SDs	Cronbach's Alpha	α 95% Confidence Intervals	
				Lower Bound	Upper Bound
GNA	15.74	7.19	0.92	0.89	0.94
Fear	10.28	4.73	0.88	0.84	0.91
Sadness	9.11	4.46	0.89	0.86	0.92
Guilt	9.43	4.89	0.90	0.87	0.93
Hostility	8.25	3.08	0.78	0.72	0.84
Shyness	7.73	2.81	0.67	0.58	0.76
Fatigue	9.86	3.52	0.78	0.72	0.85
GPA	27.93	7.96	0.89	0.87	0.92
Joviality	22.26	7.45	0.93	0.91	0.95
Self-Assurance	14.36	4.72	0.82	0.78	0.87
Attentiveness	12.77	3.39	0.80	0.74	0.86

Serenity	10.51	2.65	0.76	0.69	0.83
Surprise	4.84	2.15	0.74	0.66	0.82

Note. GNA = General Negative Affect; GPA = General Positive Affect.

Table 6.5. Correlations between PANAS-XD Subscales

Observed Variable	1	2	3	4	5	6	7	8	9	10	11
1. Fear	1.00										
2. Sadness	0.76	1.00									
3. Hostility	0.63	0.56	1.00								
4.Guilt	0.79	0.72	0.59	1.00							
5. Shyness	0.53	0.48	0.39	0.50	1.00						
6. Fatigue	0.48	0.43	0.36	0.45	0.30	1.00					
7. Joviality	-.26	-.23	-.19	-.24	-.16	-.15	1.00				
8. Surprise	-.12	-.11	-.09	-.11	-.08	-.07	0.40	1.00			
9. Self-Assurance	-.25	-.21	-.18	-.23	-.15	-.14	0.81	0.38	1.00		
10. Attentiveness	-.21	-.19	-.15	-.19	-.13	-.12	0.68	0.32	0.65	1.00	
11. Serenity	-.16	-.14	-.12	-.15	-.10	-.09	0.52	0.24	0.50	0.42	1.00

6.3.2 Gender-related Differences

As the sample for non-binary individuals was small (*n*=2), these participants were excluded from the gender-related analyses. Table 6.6 reports means and standard deviations of reported levels of emotion across all subscales of the PANAS-XD scales. A series of independent sample t-tests were conducted to assess the effect of gender on state emotion.

Table 6.6. Means (M), Standard Deviations (SDs) for the 11 scales of the Dutch Version of the Positive and Negative Affect Schedule – Extended across self-identified male and female participants

Scale	Males (N=76)		Females (N = 42)	
	M	SD	M	SD
General Negative Affect	14.92	6.77	17.31	7.88
Fear	9.75	4.43	11.33	5.20
Sadness	8.74	4.10	9.69	5.09
Guilt	9.30	4.77	9.79	5.22
Hostility	8.08	2.90	8.60	3.45
Shyness	7.92	2.81	7.40	2.86
Fatigue	9.70	3.30	9.83	3.71
General Positive Affect	29.00	7.68	26.52	8.12
Joviality	22.88	7.33	21.64	7.46
Self-Assurance	15.05	4.76	13.33	4.43
Attentiveness	13.21	3.34	12.17	3.34
Serenity	11.00	2.74	9.71	2.33
Surprise	4.92	2.20	4.79	2.11

All analyses demonstrated homogeneity of variance as assessed by Levene's Test for Equality of Variances (p>.05). The analysis showed that were no significant difference between the genders on scores of GNA, t(116)=-1.730, p=.086, 95% CI[-5.12, .35], d=-.33. Similarly, there were no significant differences between the genders for scores on the subscales of fear, t(116)=-1.746, p=.084, 95% CI[-3.38, .21], d=-.30; sadness, t(116)=-1.108, p=.270, 95% CI[-2.66, .75], d=-.21; guilt, t(116)=-0.509, p=.612, 95% CI[-2.36, 1.40], d=-.10; hostility, t(116)=-0.864, p=.389, 95% CI[-1.70, .67], d=-.17; shyness, t(116)=0.949, p=.345, 95% CI[-.56, 1.59], d=.18; or fatigue, t(116)=-0.205, p=.838, 95% CI[-1.45, 1.18], d=-.04.

Similarly, there was no significant effect of gender on GPA, *t*(116)=1.643*, p*=.103, 95% CI[-.51, 5.46], *d*=.17*;* joviality, *t*(116)=0.874, *p*=.384, 95% CI[-1.57, 4.04], *d*=.17; self-assuredness, *t*(116)=1.923, *p*=.057, 95% CI[-.05, 3.49], *d*=.37; attentiveness, *t*(116)=1.625, *p*=.107, 95% CI[-.23, 2.32], *d*=.31; or surprise, *t*(116)=0.325, *p*=.743, 95% CI[-.69, .96], *d*=.06. There was, however, a significant effect of gender on reported levels of serenity, *t*(116)=2.571, *p*=.011, 95% CI[.30, 2.28], *d*=0.49, with males having reported significantly higher levels of serenity (M = 11.00, SD = 2.74) compared to females (M = 9.71, SD = 2.33; see Figure 6.2). This result is in line with gender differences, both in terms of direction and effect size, found in the original PANAS-X (Watson & Clark, 1999) where males reported significantly higher levels of serenity compared to females.

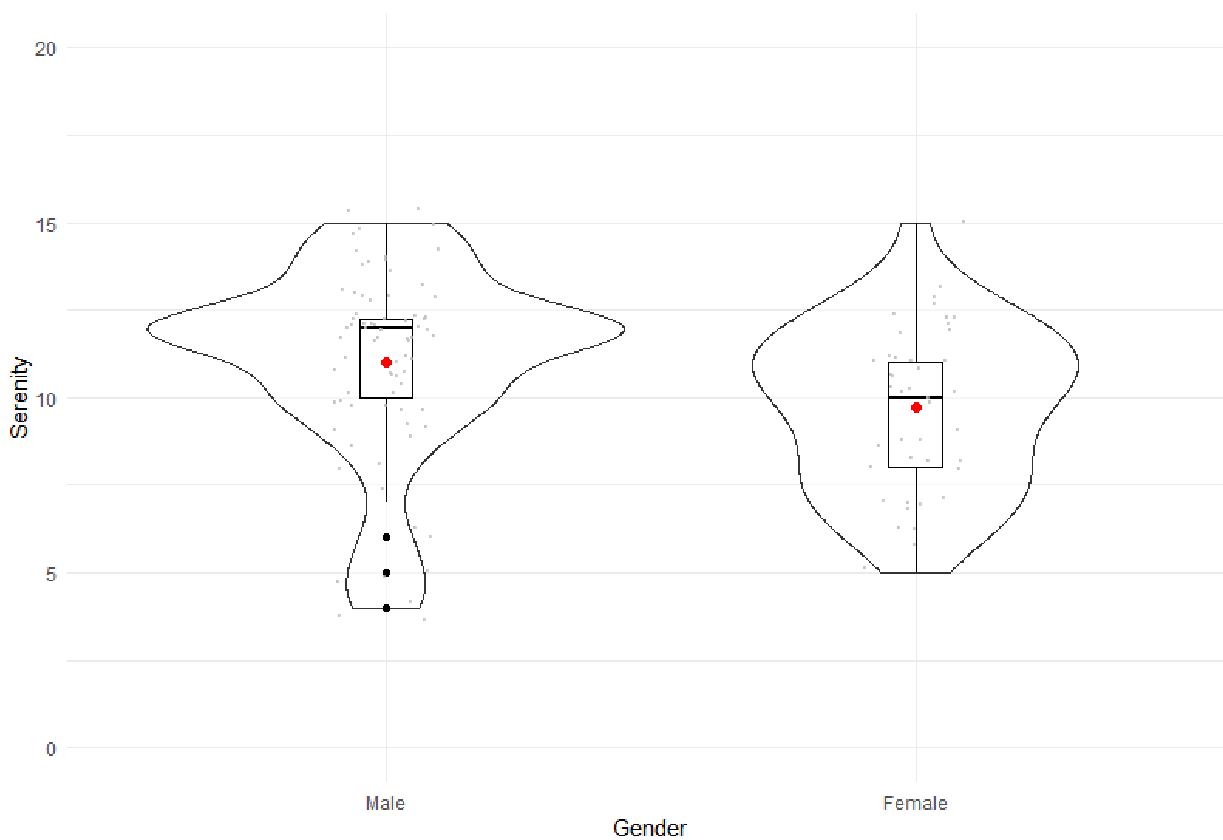


Figure 6.2. Parameters of PANAS-XD serenity scores for the different genders presented as boxplots, indicating the median and quartiles with whiskers reaching up to 1.5 times the

interquartile range. The violin plot outlines illustrate kernel probability density, i.e. the width of the outlined area represents the proportion of the data located there. Individual data points are plotted in grey, outliers ±3.5 SDs from the mean are plotted in black. The red dot represents the mean.

6.3.2 Construct Validity

Construct validity assesses the extent to which the translated scale measures the latent construct in a manner that is consistent with the theoretical framework. Construct validity of the PANAS-XD was confirmed using CFA. The constructs tested were those outlined by the theoretical models of Watson and Clark (1999). While all versions of the PANAS-X – original and translations – have documented a two-factor structure, the present analysis will compare all potential structures to demonstrate construct validity.

The following goodness-of-fit indices will be assessed (acceptable threshold): $\chi^2/df<3$ (Kline, 1998), RMSEA≤0.08, CFI≥0.90 (Browne & Cudeck, 1993), and SRMR<.08 (Hu & Bentler, 1999) using the RML method. Bollen-Stine bootstrapping was applied to all models to assess model fit.

6.3.2.1 Model (1) One-Factor Model

The first model assumes that state emotion is a one-factor structure composed of fear, sadness, guilt, hostility, shyness, fatigue, joviality, attentiveness, surprise, and serenity. That is, all subscales are combined to measure state emotion and form a single factor of 'Emotion'. This CFA model of the PANAS-XD hypothesises a priori (a) responses to the emotion items can be explained by one factor: Emotion; (b) each item has a non-zero loading on the affect factor it was designed to measure, and near-zero loading on the other factors (Zevon & Tellegen, 1982); and (c) the error/uniqueness terms associated with the item measurements are uncorrelated (Byrne, 2016).

The sample data did not fit the hypothesised model on any of the recommended incremental and residual fit indices. The indices of fit were: $\chi^2(35, N=120)=306.024$, $p<0.001$, CFI=0.487, RMSEA=0.254, 90% CI [.230, .279], SRMR = 0.241, χ^2/df ratio=8.744. Factor loadings can be seen in Figure 6.3. Bollen-Stine bootstrapping was applied with 2000 simulated samples. The null hypothesis was rejected, $p<.001$, further indicating the poor fit of the one-factor model. Taken together, the goodness-of-fit indices indicate that Model (1) does not fit the data well.

6.3.2.2 Model (2) Two-Factor Model

The two-factor CFA model hypothesises a priori that (a) responses to the emotion items can be explained by two factors: Positive Affect (PA; joy, self-assurance, attentiveness, serenity, surprise) and Negative Affect (NA; hostility, fear, sadness, guilt, shyness, fatigue; Watson & Clark, 1999); (b) each item has a non-zero loading on the affect factor it was designed to measure, and near-zero loading on the other factors (Zevon & Tellegen, 1982); (c) the two factors are correlated; and (d) the error/uniqueness terms associated with the item measurements are uncorrelated.

The present analysis tests the possibility that the 10 unobserved variables of fear, sadness, guilt, hostility, shyness, fatigue, joviality, attentiveness, surprise, and serenity, measure state affect forming two-factors of PA and NA. The sample data did not adequately fit the hypothesised model based on all recommended incremental and residual fit indices. Indices of fit were: $\chi^2(43, N=120)=144.661$, $p<0.001$, CFI=0.846, RMSEA=0.140 (90% CI: 0.117, 0.164); SRMR=0.158; χ^2/df ratio = 3.364. Factor loadings can be seen in Figure 6.4. The two latent factors negatively correlated, $z=-3.546$, $p<0.001$. Bollen-Stine bootstrapping with 2000 samples was conducted; the null hypothesis was significant, $p<.001$, indicating that the model fit the sample better in all of the simulations compared to the actual sample. This gives further evidence for poor approximate fit in the real sample.

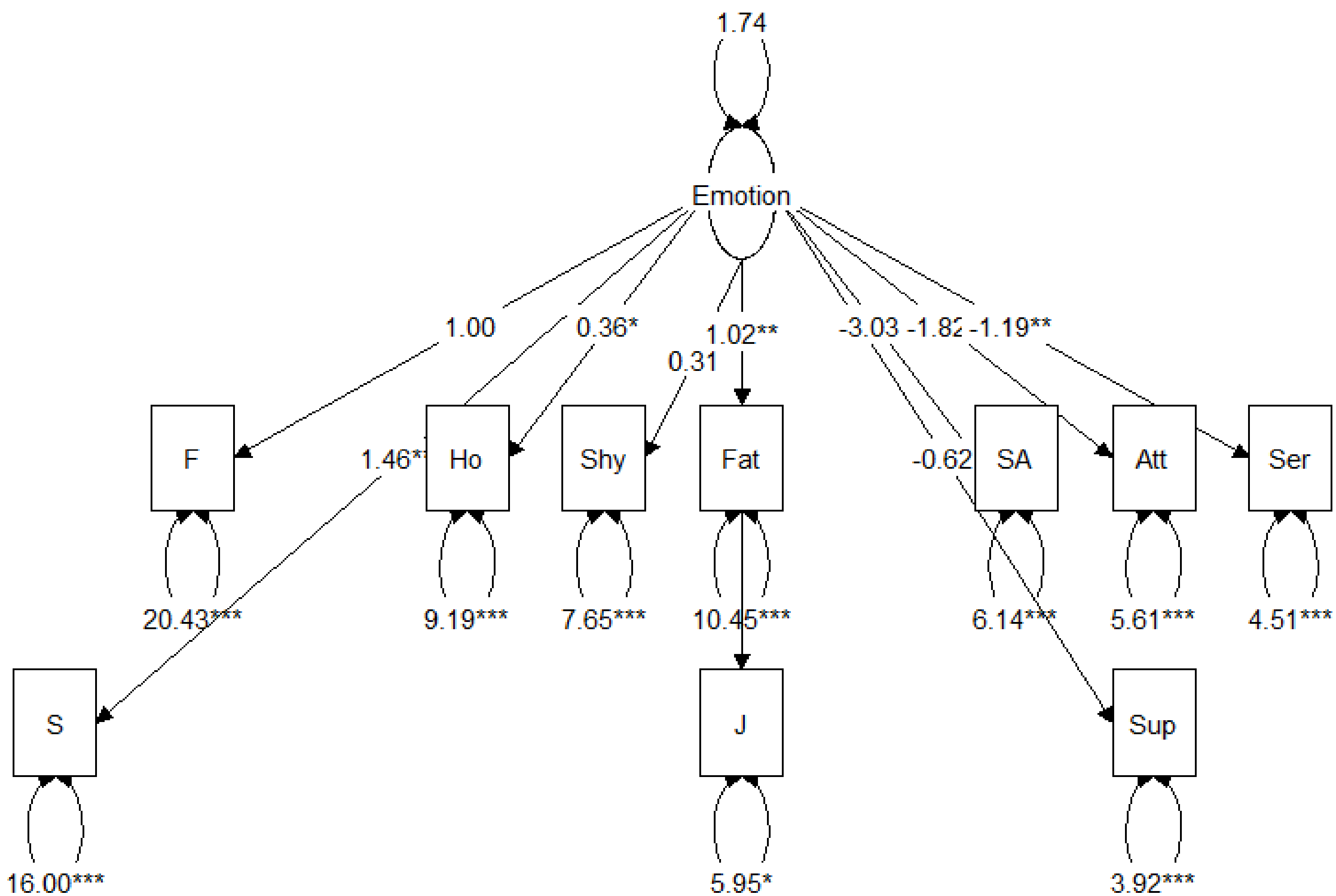


Figure 6.3. Results for the one-factor structural equation model for the Dutch Version of the Positive and Negative Affect Schedule – Extended. Comparative Fit Index=0.487; Root Mean Square Error of Approximation=0.254; chi-square=306.024; degrees of freedom=35.

Note. F=fear, S=sadness, Ho=hostility, Shy=shyness, Fat=fatigue, J=joviality, SA=self-assurance, Att=attentiveness, Sup=Surprise, Ser=serenity, *=*p*<.05, **=*p*<.001, ***=*p*<.001.

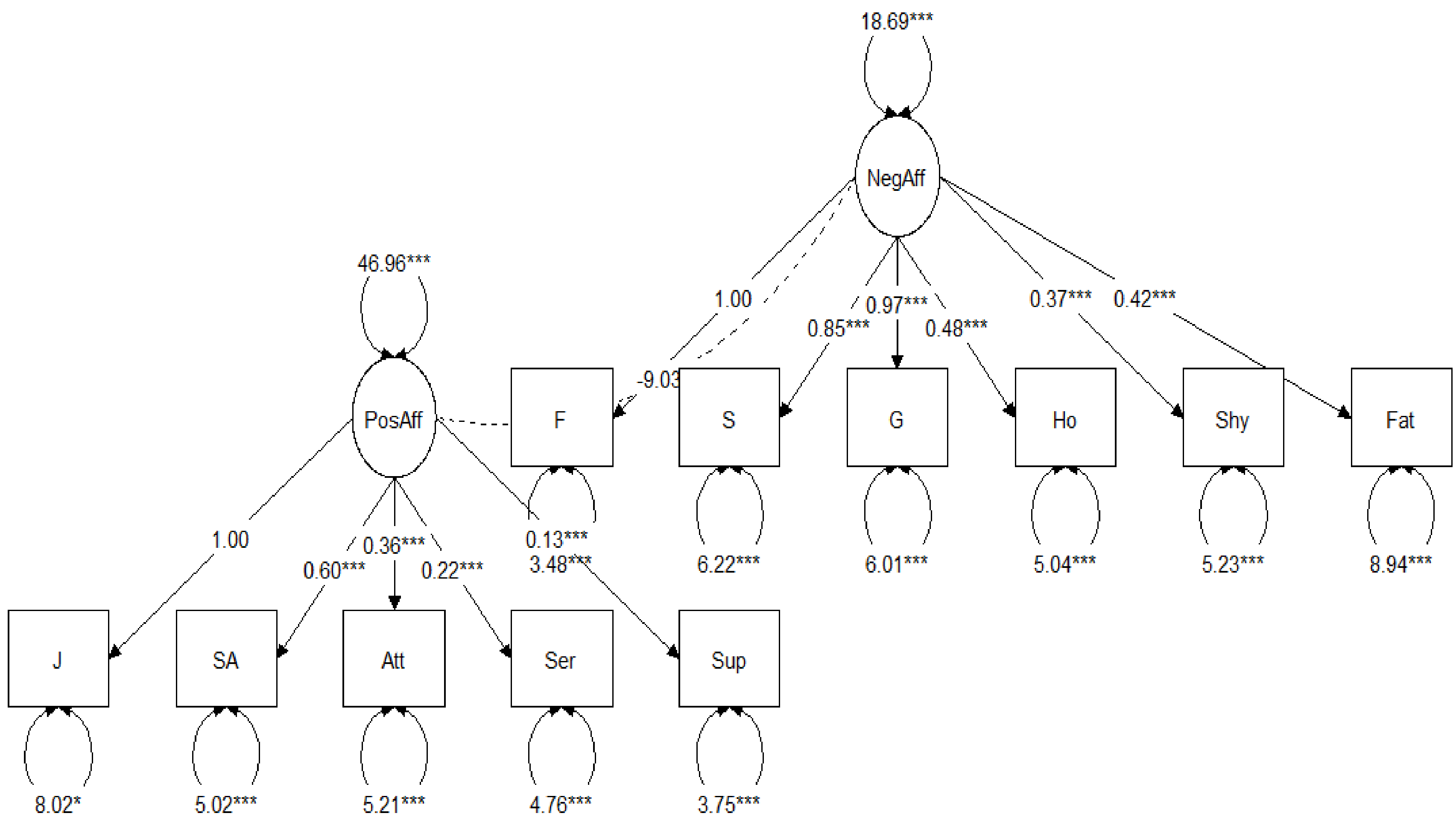


Figure 6.4. Results for the two-factor structural equation model for the Dutch Version of the Positive and Negative Affect Schedule – Extended. Comparative Fit Index=0.846; Root Mean Square Error of Approximation=0.140; chi-square=144.661; degrees of freedom=43.

Note. PosAff=PA, NegAff=NA, F=fear, S=sadness, Ho=hostility, Shy=shyness, Fat=fatigue, J=joviality, SA=self-assurance, Att=attentiveness, Sup=Surprise, Ser=serenity, *=*p*<.05, **=*p*<.001, ***=*p*<.001.

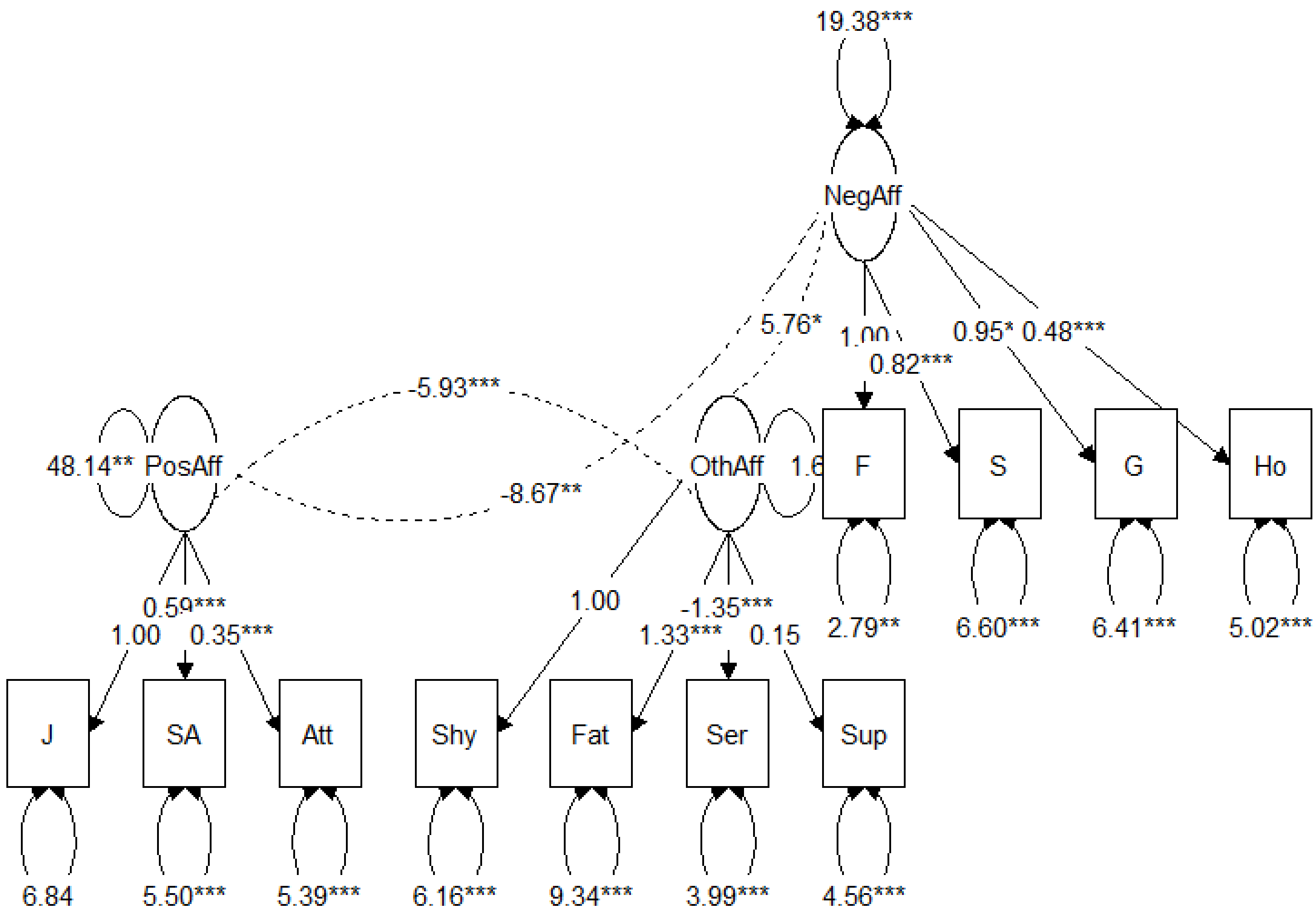


Figure 6.5. Results for the three-factor structural equation model for the Dutch Version of the Positive and Negative Affect Schedule – Extended. Comparative Fit Index=0.832; Root Mean Square Error of Approximation=0.150; chi-square=151.873; degrees of freedom=41.

Note. PosAff=Positive Affect, NegAff=Negative Affect, OthAff=Other Affect, F=fear, S=sadness, Ho=hostility, Shy=shyness, Fat=fatigue, J=joviality, SA=self-assurance, Att=attentiveness, Sup=Surprise, Ser=serenity, *=*p*<.05, **=*p*<.001, ***=*p*<.001.

6.3.2.3 Model (3) Three-Factor Model

The three-factor CFA model hypothesises a priori that (a) responses to the emotion items can be explained by three factors: PA (joy, self-assurance, attentiveness), NA (hostility, fear, sadness, guilt), and Other Affect (OA; shyness, fatigue, serenity, surprise; Watson & Clark, 1999); (b) each item has a non-zero loading on the affect factor it was designed to measure, and near-zero loading on the other factors (Zevon & Tellegen, 1982); (c) the three factors are correlated; and (d) the error/uniqueness terms associated with the item measurements are uncorrelated.

Again, the model was an inadequate fit for the sample. Indices of fit were: $\chi^2(41, N=120)= 151.873$, $p<0.001$, CFI=0.832, RMSEA=0.150 (90% CI: 0.126 – 0.175); SRMR=0.141; χ^2/df ratio = 3.704. Factor loadings can be seen in Figure 6.5. The latent factors of PA and NA were negatively correlated with one another, $z=-3.253$, $p=.001$, as were PA and OA, $z=-3.237$, $p=.001$. However, NA and OA were found to be positively correlated, $z=12.934$, $p<0.001$. Bollen-Stine bootstrapping with 2000 samples was conducted; the null hypothesis was significant, $p<.001$, indicating that the model fit the simulated samples better than the real sample, thus emphasising poor fit.

6.3.2.4 Model Selection

By comparing the summary of goodness-of-fit measures of the three previously described models, it can be concluded that Model (2), which allows for two-factors, is the model that best fits the data (see Table 6.7 for comparison of fit indices). That is, the goodness-of-fit indices are the closest to the stipulated acceptable thresholds. Despite this, in the current analysis, using the RML method, the two-factor model is rejected according to several goodness-of-fit indices. The results are, however, comparable to the confirmatory factor analysis undertaken on the original version of the PANAS-X (Bagozzi, 1993), who found that their two-factor model was also rejected according to several goodness-of-fit indices, $\chi^2(32, N=195)=234.71$, CFI=0.850; χ^2/df ratio=7.313, as well as poor fit for a two-factor model in the Portuguese translation of the PANAS-X (Costa et al., 2020), $\chi^2(158, N=1100)=828.137$, CFI=.911, RMSEA=.062, 90%

CI [.058, .066], χ^2/df ratio=5.241. In light of the goodness of fit indices of the original PANAS-X (Bagozzi, 1993), it is reasonable to suggest that the PANAS-XD has acceptable fit to the two-factor model.

Table 6.7. Goodness-of-fit indices of Models for self-reported state emotion measured by the PANAS-XD (N=120)

Model	Goodness-of-fit Indices					
	χ^2	df	χ^2/df	CFI	RMSEA	SRMR
(1)	306.024	35	8.744	0.487	0.254	0.241
(2)	144.661	43	3.364	0.846	0.140	0.158
(3)	151.873	41	3.704	0.832	0.150	0.141

Note. χ^2=chi-square; df=degrees of freedom; χ^2/df=ratio of chi-square to degrees of freedom; CFI=Comparative Fit Index; RMSEA=Root Mean Square of Approximation; SRMR= Standardised Root Mean Square Residual. The previously outlined threshold for fit indices were $\chi^2/df<3$, RMSEA≤0.08, and CFI≥0.90.

6.3.3 Convergent Validity

Convergent validity is concerned with measuring the degree to which scale items are related in measuring the same concept or construct (Cunningham, Preacher, & Banaji, 2001). Three criteria are used to assess the convergent validity of each factor in Model (2): factor loadings should be greater than 0.4 (Matsunaga, 2010); composite reliability should be 0.7 or higher (Hair, Hult, Ringle, & Sarstedt, 2021); and average variance extracted (AVE) should be 0.5 or greater (Hair, 2009).

For convergent validity, both latent factors, that is NA and PA, meet or exceed the outlined thresholds (see Table 6.8). More specifically, all factor loading values exceeded the threshold of 0.4, with a range of 0.52-0.92 for negative emotion and 0.43-0.92 for positive emotion. Acceptable factor loadings indicate a high degree of positive relationship between observed variables to measure their respective latent factor. Further, the composite reliability was above 0.7 for both factors, being 0.75 for NA and

0.758 for PA. The composite reliability statistics indicate that the observed variables associated with each factor have good overall reliability. Finally, the AVE was 0.557 for PA and 0.534 for NA, both of which are greater than 0.5. Overall, the convergent validity results indicate that the observed variables which measure their respective latent factor are related in both instances.

Table 6.8. Unstandardized Coefficients and Critical Ratios for the Dutch Version of the Positive and Negative Affect Schedule – Extended for the 2-Factor Confirmatory Factor Analysis

Observed Variable	Latent Factor	FL	*P*	*β*	SE	CR
Fear	Negative Emotion	0.92	<0.001	1.00		
Sadness	Negative Emotion	0.83	<0.001	0.850	0.068	12.588
Hostility	Negative Emotion	0.68	<0.001	0.483	0.054	8.944
Guilt	Negative Emotion	0.86	<0.001	0.974	0.072	13.528
Shyness	Negative Emotion	0.52	<0.001	0.372	0.053	6.116
Fatigue	Negative Emotion	0.57	<0.001	0.422	0.069	7.019
Joviality	Positive Emotion	0.92	<0.001	1.00		
Surprise	Positive Emotion	0.88	<0.001	0.134	0.028	12.286
Self-Assuredness	Positive Emotion	0.74	<0.001	0.602	0.046	9.784
Attentiveness	Positive Emotion	0.43	<0.001	0.362	0.037	4.786

Serenity	Positive Emotion	0.56	<0.001	0.217	0.032	6.781

Note. FL=Factor Loading; *p*=probability level; β=Unstandardised Coefficient; SE=Standard Error; CR=Critical Ratio.

6.3.4 Discriminant Validity

Discriminant validity tests whether concepts which are not supposed to be related are unrelated. Discriminant validity of the PANAS-XD constructs was tested by comparing AVE values for PA and NA with the square of the correlation estimates between the same two constructs. To have evidence of discriminant validity, the AVE should be greater than the squared correlation estimates (Fornell & Larcker, 1981). In the assessment of discriminant validity with positive emotion and negative emotion, the AVE of PA was 0.557 and NA was 0.534, both of which are greater than the squared correlation matrix value between the two factors, 0.093. This result suggests that each factor shares more variance with its relevant observed variables than with the other observed variables.

6.3.5 Divergent Validity

Divergent validity assesses the extent to which responses on the translated scale correlate with instruments that measure unrelated but correlated constructs (Tsang et al., 2017). The divergent validity of the PANAS-XD was assessed from the pattern of relationships the Dutch Big Five Index (BFI) personality measure (Denissen, et al., & Potter, 2008). The present analysis examines the evidence for correlations between the BFI and PANAS-XD based on the findings of the original PANAS-X; that is, correlations that were statistically significant in the original translations are re-tested in the PANAS-XD translation to assess the validity of the scale. These correlations are outlined in respective sections below and visualised in Figure 6.6.

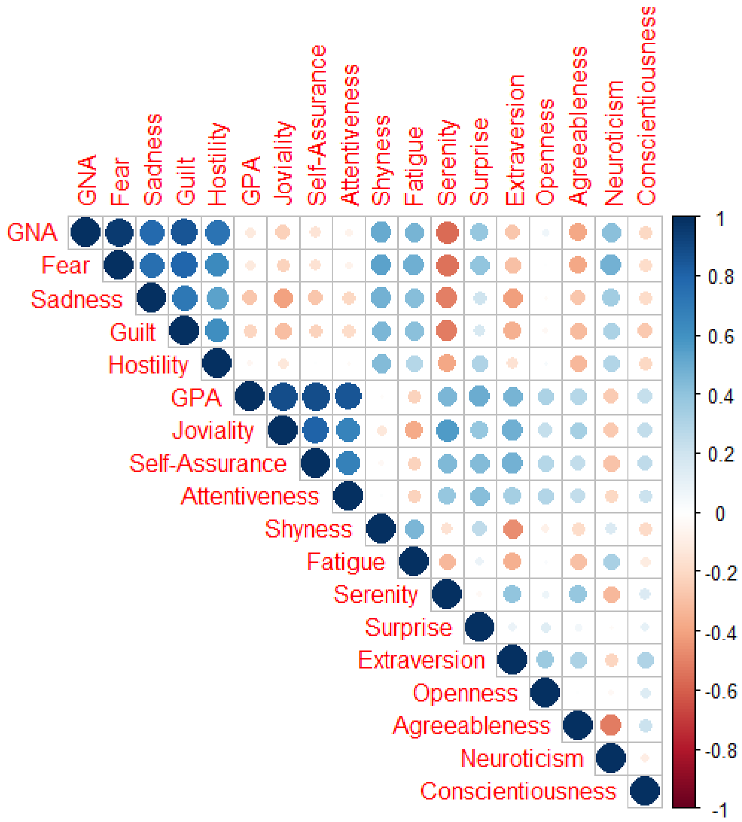


Figure 6.6. Correlation table between PANAS-XD subscales and Dutch BFI subscales. GNA=general negative affect; GPA=general positive affect.

6.3.6.1 Neuroticism

The original PANAS-X (Watson & Clark, 1999) demonstrated a significant positive relationship between neuroticism and the following subscales: GNA; fear; sadness; hostility; guilt; shyness; and fatigue. There was also evidence of a negative relationship between neuroticism and the latent variable self-assuredness and the observed variable of general positive affect. Consistent with expectations, neuroticism correlated positively with GNA, r=0.363, p<0.001. This replicates the results from American samples (Costa & McCrae, 1980) and Romanian samples (Cotigă, 2012). Similarly, there was a significant, positive relationship between neuroticism and fear, r=0.377, p<0.001; sadness, r=0.428, p<0.001; hostility, r=0.251, p=.006; guilt, r=0.308, p<0.001; shyness, r=0.181, p=.048; and fatigue, r=0.245, p=.007. Conversely, there was evidence of a significantly negative correlation between neuroticism and self-assuredness, r=-0.227, p=.013. There was also evidence of a small, negative correlation between GPA and neuroticism, which was statistically significant, *r*=-0.181, *p*=.048 (see Figure 6.7 for all plots). This converges with that of Watson and Clark (1999) and Cotigă (2012) in American and Romanian samples respectively, and thus the first hypothesis (H1) was supported.

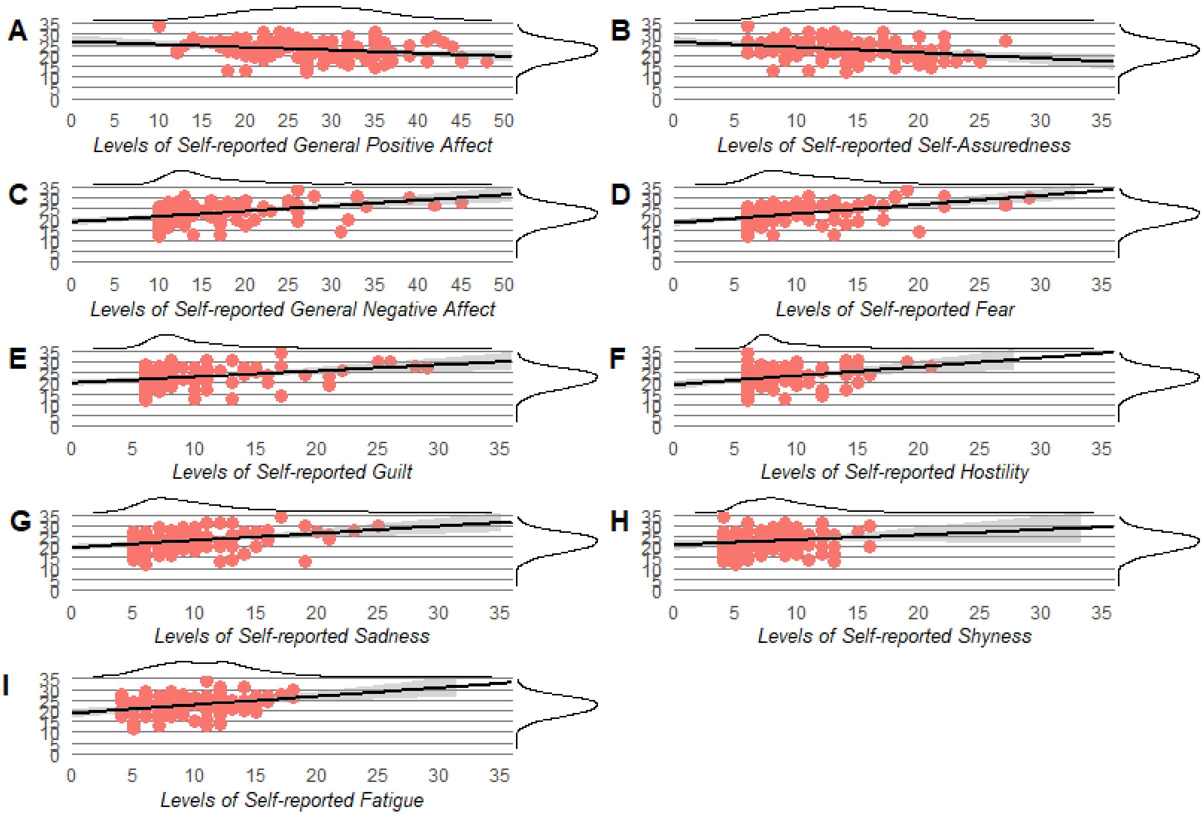


Figure 6.7. Series of scatter plots illustrating the relationship between PANAS-XD subscale scores and trait Neuroticism. The density plots on both axes illustrate kernel probability density, i.e. the width of the outlined area represents the proportion of the data located there.

6.3.6.2 Extraversion

When assessing the relationship between personality measures and emotion on the original PANAS-X (Watson & Clark, 1999), there was evidence of a significant positive relationship between extraversion and the observed variable GPA, as well as between all the latent constructs: joviality; surprise; self-assuredness; attentiveness; and serenity. There was also evidence of a negative relationship between extraversion and sadness in the original translation. In line with the original PANAS-X, the PANAS-XD demonstrated a positive correlation between extraversion and GPA, r=0.404, p<0.001. Similarly, there was a significant, positive relationship between extraversion and joviality, r=0.460, p<0.001; surprise, r=0.318, p<0.001; self-assuredness, r=0.436, p<0.001; attentiveness, r=0.287, p=.001; and serenity, r=0.295, p<0.001. Conversely, there was evidence of a significantly negative correlation between extraversion and sadness, r=-0.196, p=.032 (see Figure 6.8 for all plots).

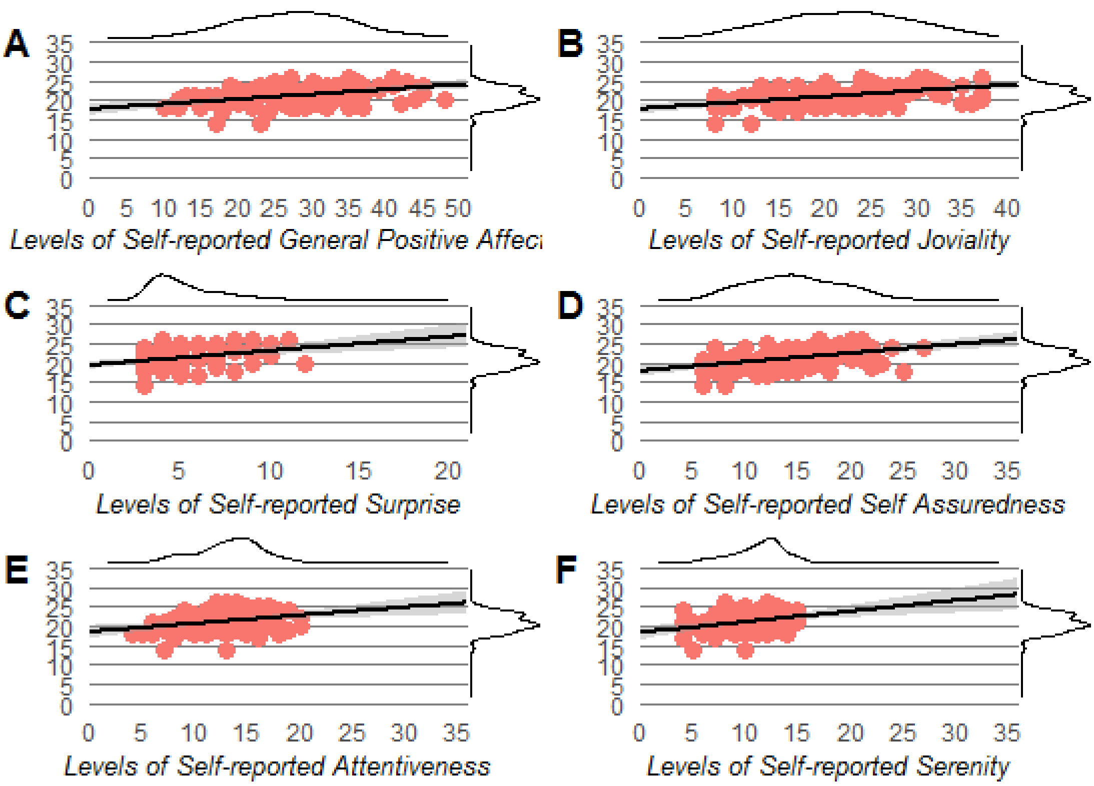


Figure 6.8. Series of scatter plots illustrating the relationship between PANAS-XD subscale scores and trait Extraversion. The density plots on both axes illustrate kernel probability density, i.e. the width of the outlined area represents the proportion of the data located there

6.3.6.3 Conscientiousness

The original PANAS-X (Watson & Clark, 1999) demonstrated a significant positive relationship between conscientiousness and the latent construct: attentiveness. Contrary to expectations, conscientiousness did not significantly correlate with attentiveness in the PANAS-XD, *r*=0.068, *p*=.459 (see Figure 6.9).

6.3.6.4 Agreeableness

When assessing the relationship between personality measures and emotion on the original PANAS-X (Watson & Clark, 1999), there was evidence of a significantly negative relationship between agreeableness and the latent construct of hostility. In contrast to expectations, the PANAS-XD demonstrated a non-significant relationship between agreeableness and hostility, *r*=0.135, *p*=.141. In the original PANAS-X, there was also evidence of a significant, positive relationship between agreeableness and the latent variable self-assuredness; a finding which was replicated in the PANAS-XD, *r*=0.207, *p*=.024 (see Figure 6.10 for all plots).

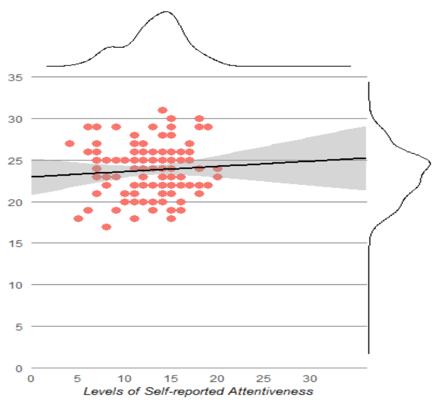


Figure 6.9. Scatter plot illustrating the relationship between PANAS-XD attentiveness subscale score and trait Conscientiousness.

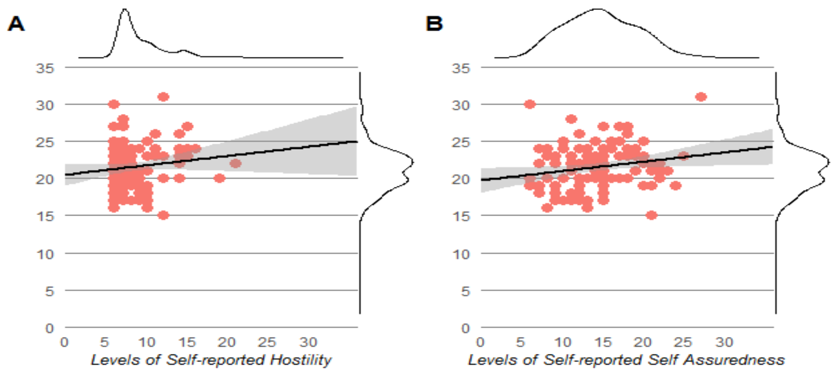


Figure 6.10. Series of scatter plots illustrating the relationship between PANAS-XD subscale scores and trait Agreeableness. The density plots on both axes illustrate kernel probability density, i.e. the width of the outlined area represents the proportion of the data located there.

6.4 Discussion

The present study developed and validated a Dutch version of the Positive and Negative Affect Schedule – Extended (PANAS-XD). To assess the validity of the translation, the internal validity, factor structure, and external validity of the PANAS-XD were assessed in a sample of Dutch native speakers. Overall, the PANAS-XD exhibited good psychometric properties. Cronbach's Alpha statistics for all subscales were satisfactory across all subscales, indicating good internal validity. Except for the serenity subscale, the analyses revealed few consistent gender differences; a finding congruent with Watson and Clark's (1994) original findings and that of Cotigă's (2012) findings in the development and validation of the Romanian version of the PANAS-X. CFA indicated an adequate fit, comparable to that of the original scale structure, thereby suggesting satisfactory construct validity. The data supported a model of two affective dimensions of positive and negative affect, and several distinguishable, co-occurring emotion states, similar to that proposed by Watson and Clark (1992). Using the results from the CFA, adequate levels of convergent and discriminant validity were demonstrated. Divergent validation using the Dutch Big Five Index (BFI; Denissen, et al., 2008) similarly indicated good concurrent validity. Thus, the results provide evidence that the PANAS-XD may be a reliable and valid measure of self-reported affect in Dutch native speakers.

6.4.1 Descriptive Statistics and Internal Reliabilities

The internal reliability of the PANAS-XD was tested using Cronbach's alpha statistical analyses. Cronbach's alpha (α) indicates the degree to which items reflect the same construct in a single administration of a psychometric (Cronbach, 1951). That is, α provides proportional evidence to suggest that a specific scale only measures one concept. The PANAS-XD demonstrated a high Cronbach's alpha statistic on all sub-scales in the PANAS-XD; statistics which were similar to that of the original scale (Watson & Clark, 1999). High internal consistency coefficients demonstrate that the PANAS-XD can generate reliable scores. The narrowness of the confidence intervals associated with these coefficients indicates that the alpha statistics can be regarded as providing very accurate estimates of the internal consistency of the PANAS-XD subscales within the present sample. Thus, all sub-scales on the PANAS-XD may be viewed as possessing adequate reliability.

The validity of items can also be assessed through an analysis of difference in mean scores between demographic groups. It is important to examine whether the PANAS-XD remains invariant across genders, as variance across demographic variables may render a psychometric test invalid in different populations. When the means and standard deviations of the subscales were analysed, the results indicated few consistent gender differences. This is in line with the results of previous translations (Cotigă, 2012) and the original scale (Watson & Clark, 1999). The results indicated a significant difference between the genders on the sub-scale of serenity, with male participants reporting higher levels of serenity compared with female participants. This replicates that of previous research suggesting that males have a higher probability of reporting serenity than females on the PANAS-X. Research suggests that males expect that they will experience happiness and serenity to a greater extent in their daily lives when compared to women, and so males are more likely to report higher levels of serenity in measures of emotion (Hess et al., 2000). Differences in the perceptions of emotions and their antecedents are theorised to drive these gender differences, rather than occurring due to differences between the genders in the emotion generative process (Barrett et al., 1998). While it may be argued that the difference in serenity scores between males and females may be due to different response styles, or sample characteristics, the results are congruent with that of the original version (Watson & Clark, 1999).

Overall, the PANAS-XD broadly demonstrated similar gender-related response patterns to that of previous translations; that is, few consistent differences in affective experience were revealed. It may be inferred from the present results replicating that of the original PANAS-X and translation validation studies that the emotional experiences of individuals who identify as male or female are similar. Replication of this effect is argued to demonstrate validity of the measure, in line with theoretical assumptions that the experience of state emotion is not constrained by gender identity (e.g. Barrett et al., 1998). On this basis, it is reasonable to suggest, therefore, that the PANAS-XD has good internal consistency and reliability as a psychometric measure.

6.4.2 Construct Validation

CFA was used to test the construct validity of the PANAS-XD. The use of CFA to test competing models of the latent structure of the PANAS-XD yielded results in line with the structure of the original version of the PANAS-X (Watson & Clark, 1999). For the fit statistics, it is clear that a single-factor model is untenable. A three-factor model represented a less-than-adequate, though significantly better, fit than the previous one-factor model. Similarly, there was relatively more support for the two-factor model, as compared with the three-actor model, of the PANAS-XD in the current sample.

While all of the factor solutions did not meet all goodness-of-fit indices concerning the root mean squared error of approximation, the comparative fit index, and the ratio of chi-square to degrees of freedom as less than 3, it was concluded from the CFA modelling that the two-factor model, as proposed by original authors Watson and Clark (1999), best fit the data. It is important to note that while the PANAS-XD did not meet the threshold of the goodness-of-fit indices, the PANAS-XD fits the two-factor model better than the original (Bagozzi, 1993), German (Grühn et al., 2010), and Romanian (Cotigă, 2012) translations of the PANAS-X. The poor fit across all available versions of the PANAS-X may indicate that the measure itself is limited.

When appraising these results within the context of the current theoretical climate in affective science, this argument may not be surprising. As previously argued (see Chapters 1 and 2), measuring emotion is a difficult endeavour. Given the vast within- and between-individual variation in emotion experience (see 1.2.2.2) and emotion semantic space (see 1.2.2.3), any measure of emotion is likely to be limited. The present analyses found poor fit for the PANAS-XD across model fit indices, which is in line with the English, German and Romanian versions. This may mean that the hypothesised structure is not appropriate in modelling emotion experience or that there is a deeper confusion about what emotions are.

Given these results, it is appropriate to consider avenues to improve model fit or emotion measurement using the PANAS-X/PANAS-XD. While it may seem tempting to remove items to improve construct validity, it is not good CFA practice to do so. As discussed in 6.2.4, CFA tests whether data are consistent with *a priori* hypothesised latent factor structures; that is, it confirms whether the data map onto previously outlined constructs using previously agreed measures. Eliminating items as part of CFA would result in fundamentally changing the pre-stipulated factor model. As such, it is not standard or good practice to remove items. Indeed, to do so could fall within the parameters of questionable research practices (QRPs; i.e., a range of activities which distort the data in favour of the researcher's proclivities). The QRPs would occur as removing items would lead to the artificial inflation or deflation of model fit indices and the given researcher would be able to pick-and-choose the model which support their suppositions rather than the model best supported by evidence.

Instead, a better and more robust approach would be to (1) assess best model fit through a series of exploratory factor analyses (EFAs) and (2) to reassess our conceptual and philosophical understandings about what emotions are (see Chapters 1, 2, 3, and 8 for discussion). Firstly, EFAs are a data driven analytical technique which allows for a factor model to be derived from a particular dataset; that is, there is no hypothesised structure prior to analysis, instead the dataset and analytical decisions of the researcher (e.g., rotation methods, item removal, etc.) yield a factor structure. This factor structure can then be assessed using CFA. The present thesis recommends that multiple EFAs are undertaken (e.g., to ensure non-meaningful noise is not the cause of a factor structure; conduct a new EFA to assess model fit when items are removed from previous EFA; to assess whether structure is replicable) using large samples (i.e., >500 participants) from a variety of demographic backgrounds to best delineate the underlying factor structure of the PANAS-X. The yielded structure should then be assessed with multiple CFAs using large samples (i.e., >500 participants) from a variety of demographic backgrounds to best assess model fit. It is beyond the scope of the present research to undertake such a task. However, the qualitative study contained within the present thesis may serve as a starting point for this technical exercise, given that the results provide a unique insight into non-academic understandings of emotion experience (see Chapter 3).

Secondly, it is important that theoretical frameworks are robust and consistent prior to proceeding with CFA. It is noteworthy that the original PANAS-X validation (Watson & Clark, 1994) provided evidence of poor model fit; thereby suggesting that the theorised structure of the PANAS-X may not be robust. It is important to note that methodological and analytical practices have changed since 1994, not least in part due to the Research Renaissance (i.e., replication crisis; research revolution) in psychological science. This means that there is (appropriately) greater stringency on what is appraised to be good model fit which ensures better measurement practice. It may also be suggested that the theoretical framework for understanding emotion is still in flux and as such may not provide a solid foundation for emotion measurement creation and validation (for further discussion see Chapters 1, 2, and 8). It remains the recommendation of the present thesis that further work is carried out to understand how to improve emotion measurement practice.

6.4.3 Divergent Validation

To establish whether the PANAS-XD would reflect personality associated traits reflecting emotionality, the divergent validity of the PANAS-XD was assessed using the scales of the Dutch BFI (Denissen, et al., 2008). The current study analysed the dimensions of personality associated with the sub-scales on the original version of the PANAS-X (Watson & Clark, 1999). Personality dimensions have been suggested to show stronger links with specific emotional states (Grühn, et al., 2010). By assessing the relationship between personality dimensions, as measured by the Dutch BFI (Denissen, et al., 2008), the current study aimed to provide further evidence for the validity of the PANAS-XD. In line with predictions, the results demonstrated that the PANAS-XD sub-scales had good concurrent validity with measures of personality and emotionality; broadly replicating the findings of both the Romanian (Cotigă, 2012) and English (Watson & Clark, 1999) versions of the PANAS-X.

As expected, neuroticism was the strongest predictor of the general negative affect sub-scale, whereas extraversion was the strongest predictor of GPA sub-scale. For the discrete affect sub-scales, personality dimensions were also associated with divergent patterns of momentary state affect. In general, positive affect related sub-scales demonstrated strong associations with extraversion. Conversely, negative affect related sub-scales demonstrated strong associations with neuroticism. These findings replicate those of previous translations and versions of the PANAS-X, lending credence to the suggestion that the PANAS-XD demonstrates reliable multidimensionality in affect, as informed by current understandings of affective experience and dimensions of personality.

There were, however, some correlations that did not replicate those found in the original version of the PANAS-X (Watson & Clark, 1999). When assessing the relationship between agreeableness and hostility, the current sample demonstrated a non-significant relationship. There was a trend that participants who rated themselves as being more agreeable also reported themselves as being higher in state hostility. This finding is not comparable to that of previous translations of the PANAS-X. Thus, it is recommended that the hostility subscale of the PANAS-XD should be used in conjunction with other measures of anger or hostility by researchers investigating this affective experience.

Similarly, in the current sample, the personality dimension of conscientiousness did not significantly correlate with self-report levels of state attentiveness. While these findings may not converge with those of the original PANAS-X (Watson & Clark, 1999), they follow a similar trend of weak association between attentiveness and conscientiousness found in the German translation of the PANAS-X (Grühn, et al., 2010). In general, however, the PANAS-XD showed associated with personality traits in expected directions. As such it may be inferred that the PANAS-XD demonstrates good convergent, external validity.

6.4.4 Limitations

The study, despite many strengths, had some shortcomings that should be acknowledged. The major limitation of the current validation is that the sample size is small for CFA analyses. While there is no blanket recommendation available for sample sizes for factor analyses (MacCallum et al., 2001), several rule-of-thumb estimates and power calculations could have been used to ensure an adequate sample was recruited. For example, an absolute minimum of 20 participants per item is recommended by Hair and colleagues (2011), which would have resulted in a total *N*=1200 for the present study. Comrey and Lee (1992) outline the following sample thresholds: 200 as fair, 300 as good, 500 as very good, and 1,000 or more as excellent in factor analyses. The sample size recruited in the present work fall short of these rules of thumb. Thus, while the sample size was arguably small for general CFA analyses, it is likely to have been adequate in providing construct validity of the PANAS-XD. Future research should further assess the construct validity of the PANAS-XD as a form of validity checking.

A further limitation was that the sample was not fully representative of the wider population. Specifically, there is a risk of gender bias in the results as there were considerably more male participants than female or non-binary participants, and more female than non-binary participants. This may have negatively affected the representativeness of the results by possible gender-related skewness in some results. As such caution should be taken when making generalisations about and inferences from the results. Additionally, the test-retest reliability of the PANAS-XD was not measured in the present study. It is difficult, therefore, to make inferences about the stability of the PANAS-XD over time. Further research should seek to replicate the results of the present study using a larger, more representative, sample over a set period of time to further validate the PANAS-XD. However, further testing in this manner was beyond the scope of this thesis.

A final limitation of the present study is the poor construct validity of the measure. However, the impact and potential avenues for addressing this issue are discussed above (see 6.4.2).

6.4.5 Conclusion and Next Steps

In conclusion, the PANAS-XD has been shown to possess adequate psychometric properties in the current sample. The results from the CFA modelling lend support to the construct validity of the PANAS-XD subscales, and the reliabilities of all subscales were adequate. The PANAS-XD appears sufficient to measure affect among normative Dutch-native speaking populations and will subsequently be used in the next empirical study contained within this thesis. In the next chapter, I will present the findings from the study using the PANAS-XD to assess changes in emotion response systems after

Cyberball gameplay between participants who repeat a swearword and those who repeat a neutral word.

Chapter Seven: Swearing as Emotion Regulation

The present chapter will now return to empirically assessing whether a specific speech behaviour regulates the emotion of social pain.

In Study One, swearing was suggested by participants as having the propensity to regulate emotions in everyday life, coalescing with theoretical stipulations of the Process Model of Emotion Regulation (PMER; Gross, 2015) and the TCE (Barret, 2017b). As such, inferences about how swearing may influence state emotion may start to be drawn. It may be suggested that swearing can up- or down-regulate components of intense state emotion, such as the subjective experience or one's psychophysiology (see 1.1). Despite the almost universal endorsement of swearing's regulatory effects in the qualitative study and the documented association between emotion and swearing in published work (Jay & Janschewitz, 2008), swearing remains a highly under-researched behaviour. Indeed, while swearing was originally argued to be a wholly maladaptive and aggressive form of language (Berger, 1973), as the field of psychology has matured our understandings of swearing have become more nuanced (Beers Fägersten, 2012). There is a small but growing body of linguistics literature about the social functions of swearing (e.g. Beers Fägersten, 2012; Stapleton, 2010), however, there remains a dearth of experimental manipulations of swearing from which causal inferences can be made. Of note for the present body of work, to my knowledge, there is only one published paper and four unpublished research projects which have experimentally assessed the effect of verbal swearing on social pain, a field of study which is characterised by poor methodological and analytical rigour leading to a muddled model of swearing phenomena. Given that all participants in Study One discussed the perceived impact swearing can have on emotion and the prevalence of this linguistic behaviour in their everyday lives and the lives of others, there is a clear rationale for further systematic exploration into the effects of swearing.

The purpose of this chapter is to assess the extent to which swearing influences self-reported levels of state emotion and heart rate variability following a socially painful experience – Cyberball (Williams & Jarvis, 2006). The subsequent sections will present the theoretical foundations and research that link swearing and emotion (7.1), followed by an overview of the literature on swearing and social pain (7.2). I will then present my evaluations of the research discussed (7.3), and situate the present study in the available gaps left in the literature (7.4). This chapter will then investigate whether and how swearing influences state emotion associated with social ostracism (7.5 and 7.6) and discuss these findings (7.7) in an attempt to synthesise theoretical assumptions of the TCE (Barrett, 2017b) and the PMER with the empirical findings of the present study.

7.1 Swearing and Emotion

The present thesis adopts Jay and Janschewitz' (2008) definition of swearing: that swearing is taboo language used to convey connotative information. That is, swearword expression communicates information using words that refer to topics about which open discussion is socially prohibited and/or shameful, where the literal or referential meaning of the word is lost or is not the focus of the communication. For example, using Beyoncé's (2016) album *Lemonade* to draw exemplars from, the word *fuck* – literally meaning an act of sexual intercourse (Cambridge University Press, 2021), which is a topic that is considered taboo in Western culture (Earle & Blackburn, 2021) – and its derivatives can be used to denote the damaging of something (e.g., "tonight, I'm *fucking* up all your shit, boy"), indicate a lack of care or dismissal (e.g., "I don't give a *fuck*"), to express hatred (e.g., "*fuck* you hater"), signify exasperation (e.g., "always with them *fucking* excuses"), or convey depth of adoration (e.g., "blindly in love, I *fucks* with you"). While this list is by no means exhaustive, it illustrates how – through the use of the word *fuck* – information can be conveyed despite the lack of words containing the direct meaning within each sentence.

Communicating emotion similarly relies on the use of connotative information to express otherwise unknowable internal signal data to other people (see 1.2.2 for discussion). Emotion connotation is defined as the implied shared knowledge that a lexical item, such as a noun, is likely to elicit a specific emotion population (Jackson & Crosson, 2006). While the transference of emotional connotative information to lexical items unrelated to emotion is argued to be largely under-researched, it is theorised that emotional meaning is attributed to lexical items through situational, contextualised learning (Snefjella et al., 2020). For example, the noun '*birthday*' is usually associated with celebrations and culture-specific rituals – such as eating a meal consisting of roast lamb or goat and a traditional rice dish called *Jollof* in Nigeria, awakening at dawn to put on new clothes in India, and the lighting of candles on cake followed by the expression of silent wishes when blowing out the candles in Euro-American cultures (Redlich, 2020) – which are (assumed to be) positively valenced events. The affective characteristics of the event are subsequently encoded onto the lexical item to provide connotative information. In this example, the noun *birthday* is associated with positive emotionality and is thus presumed to contain connotative information which communicates data related to positively valenced emotion populations (e.g., happiness, excitement, etc.). The process of encoding affective characteristics to lexical items was demonstrated in the results of Study One, where a participant described different levels of happiness intensity concluding with "birthday party happy", which denoted, for this participant, the extremity of possible positive valence associated with the affect label *happiness* (see 3.4.1.2). This process is suggested to occur for all lexical items, irrespective of whether the emotion connotation is positive, neutral, or negative (Snefjella et al., 2020). Thus, I suggest that this also includes swearwords.

While the noun *birthday* has not been argued to implicitly convey connotative information about an individual's emotional state, the primary purpose of swearing is theorised to communicate such data to other individuals (Jay, 2008). Several lines of research provide empirical support for this notion. For example, when 72 female Dutch undergraduate students identified their reasons for swearing in everyday life, the most commonly cited reason was the expression of negative emotion (Rassin & Muris, 2005) and – from a sample of 175 undergraduate students from the United States of America – 55% of female and 27% of male participants identified emotional expression and regulation as the primary motivator of swearing (J. L. Johnson, 1993). Furthermore, 30 Irish adults sampled from non-clinical populations reported that expressing and reducing anger was the third most common reason for swearing, after humour and verbal emphasis (K. Stapleton, 2003). These quantitative findings are similar to the perceptions of swearing described by participants with those of Study One contained within the present thesis. Specifically that high-intensity emotions – such as anger – were mentioned most frequently as giving rise to swearword production and, in turn, swearword production could communicate connotative information about one's emotional state. Further, there is evidence from both the published literature and the results of Study One, that swearword production may have a function beyond emotion expression. That is, swearword production may be emotionally restorative; that it may provide relief from negative emotions while heightening positive emotions – a process I argue is likely ER. The mechanisms through which such a change occurs was, however, unclear and requires systematic exploration to remediate this knowledge gap. The present chapter aims to bridge this gap for the emotion population of social pain.

7.2 Swearing and Social Pain

The available experimental literature exploring verbal swearing and social pain is, to my knowledge[5], comprised of a single published paper (Philipp & Lombardo, 2017) and four unpublished research projects (Dobson & Ellis, 2021; Kuppens & van Beest, 2013; Piggot & Stephens, 2017; van Heesch & van Beest, 2014). I will firstly discuss Philipp and Lombardo's (2017) published work and then discuss the unpublished research in chronological order.

As there is so little published literature available exploring the effects of swearing on social pain, a grey literature review was conducted to supplement the synthesis. Grey literature is defined as any material which cannot be retrieved through a traditional index or electronic database (McKimmie & Szurmak, 2002), and is often contrasted with peer-reviewed materials (Banks, 2005). The value of grey literature has been referenced in Cochrane Collaboration guidelines for undertaking systematic reviews, which stipulates that grey literature should be presented to avoid potentially biased reporting in published materials (Higgins et al., 2019). The replicability and robustness of a research synthesis has been argued to depend heavily on the systematic,

[5] Electronic database searches were conducted using PsycArticles, PsycInfo, Medline, and PubMed via EBSCO, and using Google Scholar. Keywords (e.g. swearing, swear*, pain) were used. Boolean operators (e.g. 'AND') were applied to combine keywords, and truncation was used to retrieve variations of keywords through searching of titles and abstracts. Searches were restricted to research involving human subjects and made available in the English language.

unbiased, and transparent literature search. Thus, the present chapter aimed to provide a high-quality literature search by generating an overview of both published and unpublished studies relevant to the research questions at hand.

7.2.1 Published Literature

In Philipp and Lombardo's (2017) work, data collected from 62 undergraduate students from the USA was analysed in a study with a between-subjects design that assessed the impact of repeating either a swear or neutral word on self-reported levels of social pain. Allocation to the experimental groups occurred randomly with an average of 15.5 participants allocated to each group. In this study, after being welcomed to the lab, participants completed a word generation task in which the neutral and swearwords to be used in the study were chosen. As part of this task participants listed five words that describe a chair (neutral word) and five words they might use if they hit their hand with a hammer (swearword), and the first single-syllable word in each list (e.g., flat, fuck) was selected for use in the study. The word generation procedure replicated that of prior work exploring the effects of swearing on physical pain, in which participants generate five words describing either a chair or table, and five swearwords associated with instances of acute physical pain (Stephens et al., 2009).

Participants were then asked to complete an autobiographical writing task in which they documented an event in which they were either socially included or socially excluded by others. The autobiographical writing task took a minimum of two minutes and a maximum of six minutes to complete, and participants were encouraged to elaborate on the experience by indicating the year the event took place and the initials of the individuals involved in the event. The authors theorised that this simulated recall task and the aforementioned prompts were sufficient in eliciting social pain or a positive but otherwise undefined emotional state. After the completion of this task, participants submerged a hand into room temperature water for two minutes while repeating either a swear or neutral word. Participants then self-reported their current state emotion and levels of social pain on the Fundamental Needs and Mood questionnaire (see 4.4.3.2; Williams et al., 2000) and the modified version of Borg's perceived pain scale (Borg, 1998), which rates pain on a visual analogue scale anchored from 0 ('no pain') to 100 (‘worst pain imaginable’). Both measures were argued to measure dimensions of social pain. After these measures were completed, all participants completed a cold-pressor task – wherein a hand was submerged into water maintained between 2-5 degrees Celsius for as long as tolerable – while repeating the nonsense word ‘*dop*’ and then the Borg perceived pain questionnaire was completed again.

The Fundamental Needs and Mood questionnaire served as a manipulation check and evidenced that both needs and mood scores were significantly lower for participants in the exclusion condition, compared to those in the inclusion condition. Interesting, there was no evidence of an effect between the neutral and swearword groups on this measure after either cold-pressor tasks. However, for measures of social pain, the results for the Borg perceived pain scale documented both main and interaction effects. Participants in the exclusion condition self-reported significantly higher levels of pain compared to participants in the inclusion condition. Levels of perceived pain were attenuated by word group; there was evidence of a small but significant effect where, compared to participants who repeated a neutral word, participants who repeated a swearword during the hand submersion task self-reported lower levels of perceived pain. The authors concluded that verbal swearing is an adaptive response to social distress as it reduces levels of self-reported pain.

For physical pain, participants in the exclusion condition who had previously repeated a swearword reported lower levels of physical pain, than those who had repeated a neutral word or participants in the inclusion condition who repeated either word. The authors concluded that swearword production may prospectively buffer further pain – either social or physical – when used to mitigate social distress. This conclusion was based on the results from studies exploring the interaction between physical pain and swearword production, where a cold-pressor task is used to induce physical pain (e.g. Robertson et al., 2017; Stephens et al., 2009; Stephens & Robertson, 2020; Stephens & Umland, 2011). In these studies, participants repeated either a neutral or swear word for as long as possible. Across these studies, swearword repetition increased pain tolerance, that is participants could keep their hand submerged in the water for longer, compared to neutral word repetition. According to the social-physical pain overlap theory (see 2.5.3 for discussion), physical and social pain structures rely on overlapping neurophysiological substrates and, accordingly, interventions that moderate physical pain also regulate social pain (Eisenberger, 2016). Thus, the results and conclusions suggest that may be likely that swearword repetition can reduce levels of social and physical pain.

I argue that Philipp and Lombardo's (2017) research suffers a serious limitation. A major source of uncertainty is the measures used. The error here is that they were not validated measures of emotion or social pain. The Borg perceived pain scale (Borg, 1998) has, to my knowledge, not been used in peer-reviewed studies which elicit instances of social pain. Similarly, the Fundamental Needs and Mood Questionnaire (Williams et al., 2000), while argued to measure social pain, is most routinely used as a manipulation check for Cyberball gameplay and not as a sole measure of state emotion in itself. Guidance for use of the Fundamental Needs and Mood Questionnaire recommends that the measure is completed immediately after the ostracism event, in this case immediately after the autobiographical writing task. According to William's (2009) model of needs-threat (see 2.5.2 for discussion), the effects of ostracism elicitation procedures follow a temporal trajectory: the immediate reflexive stage, the reflective stage, and the resignation stage. If measures of ostracism are taken outside of the reflexive stage, that is measurements are not taken as an immediate follow-up to the experience, appraisals and coping mechanisms are assumed to be applied by the individual to mediate social pain. It may, therefore, be reasonable to suggest that in the current study participants may have entered the reflective stage, and as such the findings of the Fundamental Needs and Mood Questionnaire may be unreliable. Furthermore, as discussed previously (see 3.3), without a theoretically informed approach to emotion measurement, it is difficult to draw inferences relating to emotion from the data (Barrett & Westlin, 2021). A more systematic approach would measure emotion using validated measures underpinned by a theoretically and epistemologically grounded framework.

Therefore, Philipp and Lombardo's (2017) work provides limited evidence that swearing may regulate social pain in a manner consistent with the hypothesis that swearing fulfils emotion regulatory functions in line with the theoretical model of the social physical pain overlap theory (Eisenberger, 2016).

7.2.2 Unpublished Literature

The unpublished literature is, to my knowledge, comprised of four research projects[6] (Dobson & Ellis, 2021; F. J. M. Kuppens & van Beest, 2013; Piggot & Stephens, 2017; van Heesch & van Beest, 2014) which will be discussed chronologically. Across these four research projects, I argue that the lack of theoretical framework relating to social pain resulted in methodological decisions which do not model nor measure associated phenomena adequately.

It is noted that the studies contained in this section were, except for Dobson and Ellis' (2021) work, undertaken within labs for which individuals associated with this current study are the primary investigators (RS, IVB). It is recognised that due to publication bias – defined as the failure to publish results based on the strength or direction of a study's results and which ensures the disproportionate publication of significant findings and inflated effect sizes (Parsons et al., 2022) – there may be further research projects exploring the effect of swearing on social pain which have been undertaken outside of these laboratories. However, it is only possible to discuss the unpublished studies which are known to exist. As such, the present literature review should be understood with the caveat that further investigations may have occurred but are not discussed herein.

In Kuppens and van Beest's (2013) study, 142 participants were recruited for a between-subjects study exploring the effect of word repetition on social pain elicited by Cyberball gameplay, where independent variables were (1) inclusion or exclusion from gameplay, and (2) neutral or swearword repetition. Allocation to the experimental groups occurred randomly with an average of 23.67 participants allocated to each group. In this study, after being welcomed to the lab, participants completed a word generation task in which the neutral and swearwords to be used in the study were

[6] Electronic database searches were conducted using Bielefeld Academic Search Engine, e-Theses Online Service, Elsevier Scopus, and Google Scholar. Studies already known to OB/RS/IVB were included. Keywords (e.g. swearing, swear*, pain) were used. Boolean operators (e.g. 'AND') were applied to combine keywords, and truncation was used to retrieve variations of keywords through searching of titles and abstracts. Searches were restricted to research involving human subjects and made available in the English language.

chosen. Replicating prior work (e.g. Stephens et al., 2009), as part of this task participants listed five words that describe a table (neutral word) and five swearwords. Participants selected their preferred word from each list and this word was used in the word repetition task.

Participants then played a single game of Cyberball, comprised of 50 ball tosses, in which they were either included, receiving 34% of all ball tosses, or excluded, receiving 10% of all ball tosses. Participants were instructed to repeat their word every time the ball was thrown irrespective of the recipient. After the game concluded, participants self-reported their levels of pain on an 11-point Likert scale, anchored by 'no pain' (1) to 'a lot of pain' (11), and completed the Fundamental Needs and Mood Questionnaire (Williams, 2006).

The results showed that participants in the exclusion condition self-reported higher levels of pain and needs threat compared to participants in the inclusion condition. There was, however, no effect of word group on either measure, with participants repeating neutral and swearwords reporting equivalent levels of perceived pain. Difficulties in interpreting these results arise when considering the achieved power of the study and the measures used. With a sample of 142, the study achieved 53% power to detect a medium effect. These results, therefore, need to be interpreted with caution. Furthermore, the 11-point Likert scale question posed has not previously been used or validated in emotion or social pain research, as such it is important to bear in mind that the measure may not adequately represent the construct under investigation. Specifically, it is unclear what 'a lot of pain' refers to, whether this was interpreted similarly by all participants, and whether the measure is sensitive to between participant variations. While this may seem unlikely, errors in question interpretation between what the researcher meant and what the participant understands, also known as face validity, are common when creating measurement (Thomas et al., 1992) and without validation caution should still be applied to the results.

van Heesch and van Beest's (2014) research used an autobiographical writing task to explore the effect of word repetition on recalled social or physical pain in 352 US American Amazon Mechanical Turk (MTurk) workers. Participants were randomly assigned into a writing condition in which they either wrote an autobiographical diary entry about a socially painful experience, a physically painful experience, or a typical Wednesday afternoon (control) that had occurred in the past 5-years. Participants were then asked to generate five words associated with a table (control) and five swearwords. Subsequently, participants were allocated into either a swearword or control word repetition group and were asked to repeat the first item on the appropriate list for 40-seconds. After this participants completed the Fundamental Needs and Mood Questionnaire (Williams, 2006), the Borg perceived pain scale (Borg, 1998), and the Wong-Baker Pain Rating Scale (WBS; Wong et al., 1996). The WBS asks participants to rate their pain on a 6-point scale comprised of six cartoon-depicted faces expressing increasing distress, ranging from a smiley (0) to a crying (10) face. The WBS is typically used in paediatric clinical populations as it does not necessarily rely on language comprehension for the individual to express their pain experience (Garra et al., 2010) and has, to my knowledge, not been used to measure social pain in adult populations previously. It was hypothesised that swearword repetition would lead to a reduction in self-reported pain levels across the groups writing about a painful experience, and that there should be no effect of word repetition on the control participants.

The results showed that participants who repeated a swearword reported significantly higher levels of pain across all measures compared to participants who repeated a control word. Further, participants who wrote about either a socially or physically painful experience self-reported higher levels of pain as measured by the WBS. Surprisingly, participants who wrote about a socially painful experience reported lower levels of needs threat on the Fundamental Needs and Mood Questionnaire compared to participants in the control or physical pain conditions. This is an unexpected result as the Fundamental Needs and Mood Questionnaire measures outcomes related to social ostracism, which were not induced in either the physical pain or control writing tasks.

In this investigation (van Heesch & van Beest, 2014) there were two primary sources of error. One error was the emotion induction protocol, which asked participants to write about an experience that had occurred in the past 5 years. The saliency of an emotionally evocative event, such as those associated with pain, are fallible and associated with decay. Memory decay leads to less intense perceptions of emotion, meaning that less information (e.g., interoceptive experiences) and detail are available for emotions and pain experienced previously even when they were intense at the time (Broderick et al., 2008; van Boven et al., 2009). As such, it is recommended that research requiring emotional memory recall, such as autobiographical writing tasks, should take a theoretically informed approach and ask participants to recall an instance within the last 2 weeks (Gross et al., 2006). van Heesch and van Beest (2014) provided a 5-year time frame from which events could be recalled and no pre-task measures of pain were taken, as such it is uncertain the extent to which social or physical pain was reliably induced in all participants and the results should be approached with caution

A second source of error may be due to the sampling procedure. Participants were recruited through MTurk. MTurk is an online experiment participation platform where *workers* complete research tasks remotely. MTurk is associated with workers who do not perform research tasks where tasks are not directly monitored (Fort et al., 2011), such as in van Heesch and van Beest's (2014) study where participants were asked to repeat a word without proof of doing so. It is difficult to know whether participants actually completed the study, however, the possible interference of deception on the part of participants cannot be ruled out and a discerning reader should apply scepticism to the results. However, the data reported in this work appear to suggest that swearword repetition may increase perceived levels of social and physical pain.

Let us now consider Piggot and Stephen's (2017) study. In this project, 45 undergraduate students from the United Kingdom were recruited for a within-subjects design study, in which participants played a series of three exclusionary Cyberball games (see 2.5.2 and 4.4.1 for discussion) and repeated a neutral or swearword throughout gameplay. Before the start of Cyberball gameplay, participants completed a word generation task where they identified five words related to a table (neutral word) and five words they might use if they subbed their toe (swearword). The first word in both lists was selected for use in the study. Participants then played Cyberball. During gameplay, participants were asked to repetitively direct a swear word at another player, repetitively direct a neutral word at another player, or repeat a swear word. These conditions were counterbalanced. Each game was comprised of 50 Cyberball events, in which participants were excluded for 80% of all ball tosses receiving a maximum of 10 ball tosses. It is of note that the number of ball tosses received in this study (20%) is close to that of inclusion games (30%) in the majority of Cyberball research (Hartgerink et al., 2015). Exclusion Cyberball games typically either include participants in 10% of all ball-tosses across the entire game, or include participants in the first two-to-three ball tosses at the start of the game and then exclude participants throughout gameplay.

Irrespective of the number of ball tosses received, participants could elect to terminate gameplay at any point, thus meaning that there was variability in gameplay latency. Social pain tolerance was measured by gameplay latency, with prolonged latency assumed to be indicative of increased pain tolerance. Gameplay latency was recorded by the unblinded experimenter using a stopwatch, thus potentially introducing some level of bias to the procedure as the experimenter could potentially (unwittingly) confound the results to find the desired effect. After each game, state emotion was measured using a modified Fundamental Needs and Mood Questionnaire (Williams et al., 2000). It is of note, however, that the modifications have not been validated and as such, it is unclear whether the measure remains similar enough to the original version to retain psychometric validity.

The results found that when participants repeated a swearword – either in a directed fashion or repetitively – gameplay latency was increased, compared to when they repeated a neutral word. Furthermore, participants who repeated a swearword directed at another player reported higher levels of perceived ostracism than in either of the other conditions. The authors concluded that the swearword repetition increases tolerance of social pain in line with assumptions made by the social-physical pain overlap model, but when swearwords are directed at another individual it incurs an emotional cost.

The primary weakness of this study is analytical. Seven one-way ANOVAs and six paired t-tests were conducted on the data, without any adjustments made to alpha levels. This is problematic because, as the number of tests increases, so does the likelihood of a Type I error, where significant results are found and the null hypothesis is rejected when the findings occurred by chance (Parsons et al., 2022). If the null hypothesis is true and alpha levels are set at .05, a significant difference will be observed by chance in one of every 20 trials (Armstrong, 2014). To avoid the chance of Type I errors, it is recommended that alpha levels should be adjusted (Maier & Lakens, 2022). I will discuss how this impacts the results in terms of the sample size and in terms of rejection of the null hypotheses. It is noted that, as an alternative to alpha level adjustment, a MANOVA could have been conducted on the data, as it would have avoided the multiplicity correction issue. However, as Piggott and Stephens (2017) opted for multiple tests, the implications for alpha adjustments are discussed below.

If a Bonferroni correction (i.e., $\frac{\alpha}{n}$; in this instance, where the alpha threshold becomes p=0.007) is applied to the presented results from the one-way ANOVAs, the effect of word repetition upon perceived ostracism (p=.031) becomes not significant. Similarly, if a Bonferroni correction (where the alpha threshold becomes p=0.017) is applied to the results of the paired t-tests, the evidenced effect that directed swearing decreases perceived ostracism does not remain significant (p=.017). It is noteworthy, however, that even when a Bonferroni correction is applied, the effect of swearword repetition on gameplay latency remains significant. As such, one possible implication of this study is that swearword repetition does provide some form of function in mediating perceptions of social pain. Nevertheless, the explanatory model is not yet clear and further study is required to develop understandings of swearword regulatory phenomena.

Moving now to Dobson and Ellis' (2021) work, 108 psychology undergraduate students from the United Kingdom were recruited for a between-subjects study assessing the effects of sub-vocal word expression – defined as the imagined act of repeating a word – on self-reported levels of social pain. Due to COVID-19 restrictions, the study was completed online using Gorilla Experiment Builder (Anwyl-Irvine, Massonnié, Flitton, Kirkham, & Evershed, 2020). Dobson and Ellis (2021) aimed to extend the findings that swearword repetition is associated with reductions in social pain (Philipp & Lombardo, 2017), by exploring the imagined act of swearword repetition. They argued that if imagined swearword repetition could reduce levels of social pain, it may offer an adaptive option for regulating state emotion without any of the potential negative social consequences associated with swearing, such as signalling aggression (e.g. Berger, 1973).

In this study (Dobson & Ellis, 2021), after consent was gained, participants were exposed to a one-minute video of kittens which was theorised to elicit a standardised baseline level of positive state emotion in all participants. As a manipulation check, participants completed the Brief Mood Introspection Scale Questionnaire (BMIS; Mayer & Gaschke, 1988), which measured participants' self-reported levels of state emotion for eight mood states (e.g. happiness, loving, calm, energetic, anxious, angry, tired, and sad) on 4-point Likert scales anchored from 'definitely do not feel' (1) to 'definitely feel' (4). To derive a score for state emotion, negative mood state responses were reverse scored and then all responses were summed to create an overall value representing state emotion (Mayer & Cavallaro, 2019); greater scores on the BMIS represent positive state emotion, whereas lower scores represent negative state emotion. The BMIS is a theoretically informed measure of state emotion, which, according to a principle factor analysis (Mayer & Gaschke, 1988), is underpinned by the bipolar axes of negative emotion and positive emotion (see 1.2.2.3 for discussion).

Participants subsequently completed a mental imagery task, in which participants were asked to recall an incident where they were socially excluded from other individuals in a manner that induced social pain, such as in romantic heartbreak or bullying. To cement the recalled memory, participants indicated the length of time which had elapsed from the current moment and the recalled memory on a visual analogue scale anchored from 'today' (0) to '5-years' (60), and then wrote about their recalled memory as part of an autobiographical writing task, with participants reporting an event which occurred on average 25.13 months prior. The autobiographical writing task took a minimum of two minutes and a maximum of six minutes to complete. It is noted that the effects of decay to emotion recall discussed above in van Heesch and van Beest's (2014) study are likely to have similarly affected this study (Dobson & Ellis, 2021). To assess the level of elicited emotion by the mental imagery and autobiographical writing tasks, participants rated their levels of social pain on Borg's perceived pain scale (Borg, 1998) rating the levels of currently experienced pain.

Participants then completed a Stroop Task (Stroop, 1935). The Stroop Task uses colour words as stimuli, and the task requires participants to focus on one particular feature (e.g., language), while ignoring another (e.g. colour). In Stroop Task congruent conditions, colour nouns are presented in the corresponding colour (e.g. the noun ‘red’ is presented in a red colour). In incongruent conditions, colour nouns are presented in an unrelated colour (e.g. the noun ‘red’ is presented in a yellow colour). Response latencies to incongruent stimuli are usually longer than for congruent stimuli; this congruency effect (i.e. $RT_{incompatible} – RT_{compatible}$) is known as the Stroop Effect. As part of Dobson and Ellis’ (2021) Stroop Task, participants were asked to identify the presented colour select keys on a keyboard (e.g. select ‘Q’ for red stimuli) while ignoring the noun meaning (e.g. in the above incongruent condition, name the colour ‘yellow’ rather than the noun ‘red’). Participants completed 16 congruent and 48 incongruent trials.

Following completion of the Stroop Task, participants were randomly allocated into one of three experimental conditions: swearword repetition; neutral word repetition; or silence. Participants in the swearword or neutral word repetition conditions were instructed to imagine themselves sitting in a white room repeating either the word *Fuck* or *Dop*. These words were selected as a conceptual replication of previous research where the words *Fuck* and *Dop* have been used to assess the effect of swearword repetition on self-reported levels of pain (e.g. Philipp & Lombardo, 2017; Stephens & Robertson, 2020). Participants in the silence condition were asked to imagine themselves silently sitting in a white room. Participants were instructed to complete this task for two minutes, the start and end of which were indicated by an audible beep. To measure the effect of experimental condition on social pain, participants then completed the Borg perceived pain scale which measured levels of current pain associated with their recalled memory.

The results of the BMIS showed that, when aggregated, participants’ baseline levels of state emotion was a state of neutrality, thus suggesting that any evidenced effects of the emotion elicitation tasks should impact all participants similarly. An analysis of the Borg perceived pain scale responses between the experimental groups found no significant differences either before or after the experimental task. That is, participants self-reported similar levels of perceived pain irrespective of time or group.

The authors concluded that the lack of an effect was likely due to the sub-vocalised procedure; specifically, that imagining an action may not induce the consequences associated with the actual enactment of an action.

However, Dobson & Ellis (2021) failed to consider the impact the Stroop Task may have had on state emotion in line with theories of ER. According to the PMER (Gross, 2015; see 1.3), emotions may be regulated through five main pathways, including attentional deployment. Attentional deployment refers to directing one's attention towards specific stimuli to change an emotion's trajectory. Distraction, which is the shifting of attention away from the situation, is a primary strategy of attentional deployment (Wadlinger & Isaacowitz, 2011). I would therefore argue that disengagement from the emotion eliciting stimuli (e.g., recalled memory) and subsequent engagement with another task (e.g., Stroop Task), may have distracted participants from, and, as a by-product, ensured the down-regulation of elicited social pain. Dobson and Ellis (2021) did not attempt to ascertain whether the Stroop Task impacted levels of elicited social pain, as such I would argue that the study failed to measure the impact of swearword repetition on social pain and, instead, may have accidentally measured – as a within-subjects design – the impact of distraction on social pain. If the study had adopted a theoretically informed procedure, such as removing the Stroop Task, I believe it would have made a much more convincing investigation into swearword related phenomena.

7.3 Summary and Future Steps

The research discussed above provides a somewhat conflicting account of how swearword repetition regulates the emotion of social pain. In studies that had adequate power to detect an effect, the results found conflicting evidence, both increasing experiences of social pain (van Heesch & van Beest, 2014) and increasing tolerance to social pain (Piggot & Stephens, 2017). However, analytical and methodological decisions in these studies – specifically the lack of alpha correction to safeguard against Type I/II errors, the use of a procedure associated with poor emotion induction due to memory decay, and the lack of proof that the task was completed by participants – require interpretations to be made cautiously. The other studies present document similarly conflicting results, however, these works did not achieve adequate power to reliably detect a result and so caution must also be applied to interpreting these data. Thus, without a theoretically informed and methodologically robust exploration into swearword production's potential effects, the mechanism or model underlying swearword use is unknown and the knowledge gap remains open.

7.4 The Current Study

The present study aims to bridge the previously discussed knowledge gap by assessing the psychophysiological and subjective experiential components of the emotion population of social pain at primary points of the emotion generation process: throughout for measures of heart rate variability (HRV), before the exclusionary Cyberball gameplay, and after swear/neutral word repetition (see Chapter Four for discussion on methodology). To this end, the goal of the present research was to examine how swearword repetition regulates experimentally elicited state emotion compared to neutral word repetition, as evidenced by changes to self-reported state emotion and the psychobiological measure of heart rate variability (HRV; see 4.4.2). Cyberball (Williams & Jarvis, 2006; see 4.7) was used as the emotion induction procedure; it both was used to elicit an experience of positive emotionality in a first inclusionary game, and negative emotionality in a second exclusionary game. After each game, participants repeated a word aloud for 2-minutes. After the inclusion game, all participants repeated the neutral word. The neutral word was used to avoid any potential incongruence effects from repeating a swear word after a positive stimulus and to avoid the potential for eliciting an emotion by swearing. Swearword production has been proposed but not documented to elicit negative emotions in the speaker (van Berkum et al., 2019), however, I would argue that according to the TCE (Barrett, 2017b), any such emotions elicited would be contextually or goal orientated. However, to avoid potential confounds, all participants repeated a neutral word after inclusion gameplay. After exclusion gameplay, participants either repeated the neutral or swearword for two minutes. Participants completed the PANAS-X/XD after each word repetition task to assess the effects of the task on state emotion. No specific hypotheses were made concerning state emotion after inclusion gameplay. As these tasks will ostensibly be a within-subjects design, there should be no differences between the groups after inclusion gameplay (see Figure 7.1).

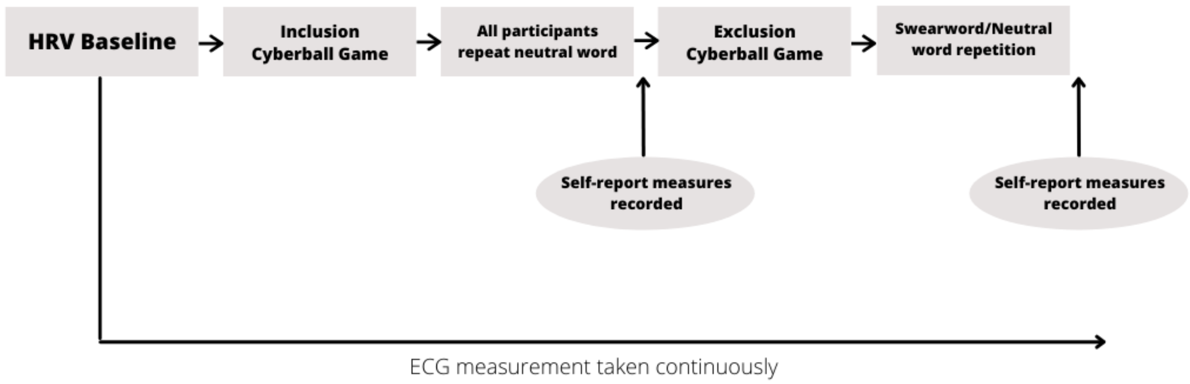


Figure 7.1. A schematic outlining the procedure of the present study.

The formulation of the present study has been informed from the findings from Studies One and Two. From a conceptual standpoint, Study One explored participants' perceptions of swearing, which informed the design and operationalisation of the study. All participants discussed swearing's popularity and association with emotional events, thus I argue that it is a reasonable behaviour to explore further. From a methodological standpoint, Study Two investigated the effects of venting on social pain emotion components, the limitations of which have informed the design of the present study. Specifically, a positive emotion event (i.e. inclusion Cyberball gameplay) was included in the design. This allows inferences about the ER effects of the intervention to be made more robustly as the difference between PANAS-X and HRV values before and after the negative stimulus and intervention can be assessed and, where differences exist, more robustly attributable to swearword repetition (see 5.9.6).

The data from Study One and the wider literature led to the following two hypotheses; following the elicitation of social pain (see 4.7; Eisenberger, 2015), swearword repetition would increase (H1) general positive state emotion as measured by the PANAS-X/XD (see 4.4.3). If swearword production induces a subjectively positive experience, that is "*feeling better*", as suggested in Study One, then up-regulation of general positive emotion should be observed compared to the control condition (neutral word repetition). Correspondingly, I hypothesised that swearing would decrease (H2) general negative state emotion as measured by the PANAS-X/XD. If swearword production fulfils regulatory processes, then it is reasonable to suggest that general negative emotionality will be downregulated compared to the control condition. The final hypothesis is that after swearing, (H3) participants who repeated a swearword would display increased HRV when compared to participants who repeated a neutral word as a by-product of parasympathetic nervous system dominance – a biomarker of adaptive self-regulation following psychological relevant stressors. Results for changes in heart rate are reported but no specific hypotheses were made related to heart rate change. Results for changes in HRV between baseline and during gameplay are reported, but no specific hypotheses were made as it is assumed that changes in HRV may be due to emotion elicitation and not regulation properties, and is thus beyond the scope of the present work.

7. 5 Methodology

The present truncated methodology section outlines the specific deviations from the previously outlined general methodology (see Chapter Four) or points that deviate from Study Two (see Chapter Five). For further details on any of the below segments, please refer to Chapter Four or Chapter Five.

7.5.1 Research Design

A mixed design was employed with the independent variable being the word repeated (swearword [intervention], n=66; neutral word [control], n=56) and the dependent variables being measures of heart rate variability (HRV) and self-reported state emotion (PANAS-X/XD scores). Both HRV (baseline; ~5 minutes after the first-word repetition; ~5 minutes after the second-word repetition) and PANAS-X/XD (after first-word repetition; after second-word repetition) scores were compared across time as both a within and between-subjects variable. Participants were randomly assigned to one of the conditions (see 4.3.1).

7.5.2 Participants

As there is little published or unpublished work available investigating the effect of swearing on emotion from which to estimate an effect size, I used the effect sizes observed in studies exploring effect sizes of swearing on physical and social pain (d=0.6, Robertson, et al., 2017; d=0.7, Philipp & Lombardo, 2017) to inform sample size calculations. Thus, a medium effect size (d=0.5) was selected as a conservative estimate of effect size. Two power analyses were conducted using GPower (Faul et al., 2007), assuming a medium effect size and alpha set to 0.05, for PANAS-X (mixed) and HRV (mixed) analyses. For the PANAS-X (mixed), assuming 80% power and default settings, this required a sample size of 34 participants. For the HRV analysis, using a mixed repeated measures design, assuming 80% power and default settings, this required a sample size of 28 participants. To remain consistent with Study Two, the present study aimed to recruit a larger sample (N=128) to ensure adequate power for all analyses.

The sample was drawn from the Netherlands. In total, 145 participants were recruited to offset participant and data attrition. Twenty-two participants were excluded in total. Eleven participants did not complete both Cyberball games within the allotted time, 2 participants did not understand the emotion words presented in the PANAS-X/PANAS-XD, 2 participants took phone calls during the experiment, 1 participant reported consuming drugs before the study which may confound the results, and 7 participants reported diagnoses of psychopathology. Therefore, 122 participants' data were included for analysis. Due to a coding error during data collection, demographic data was not recorded for participants who opted to complete the Dutch version of the experiment. For participants who completed the English version of the experiment, 45 participants' (80% female, 17.8% Male, 2.2% Non-binary, 18.2% BAME, *M*age=19.89 years, SD=1.61, range=18-24 years) demographic data was recorded. For heart rate variability (HRV) data analyses, 16 participants' data contained recurrent artefacts precluding analysis and were excluded. Four participants' data contained impossible values (e.g. 3000ms interbeat-intervals), likely derived from artefacts in the data processing stage, and were excluded. Therefore, 106 participants' HRV data were analysed. This sample size is consistent with prior work using HRV as the measure of interest (Laborde et al., 2017) and with the mixed design a priori power analysis.

7.5.3 Materials

The same materials were used as in Study Two (5.7.4), except for some key differences noted below. The experiment was designed and administered in Inquisit 5.0.

7.5.3.1 Cyberball

Participants played two games of the Cyberball paradigm. In the first game, participants were included in gameplay by the other 'players' and received 34% (*N*=10) of the total 30 ball tosses played. In the second game, participants were excluded in gameplay by the other 'players' and received 10% (*N*=3) of the total ball tosses played. Otherwise, the gameplay procedure was identical to Study Two.

7.5.3.2 Positive and Negative Affect Schedule – Extended (PANAS-X; Watson & Clark, 1999)

The primary outcome measure was the PANAS-X (Watson & Clark, 1999), and was completed by participants who self-selected the English version of the study after both word repetition tasks (see 4.4.4.3 for details). Cronbach's alpha for all subscales were good (≥.6), indicating high internal reliability of the measure (see Table 7.1). For the present study, only differences in GNA and GPA subscales were investigated, with the associated subscales to be analysed if a significant difference was found.

Table 7.1. Descriptive statistics and Cronbach's alpha for PANAS-X and PANAS-XD subscales

	PANAS-X (*n*=86)				PANAS-XD (*n*=160)			
			95% Confidence Intervals				95% Confidence Intervals	
	M (SD)	α	Lower Bound	Upper Bound	M (SD)	α	Lower Bound	Upper Bound

GNA	5.00 (5.74)	.845	.791	.889	3.66 (4.54)	.845	.807	.879
GPA	11.42 (7.96)	.894	.857	.925	12.16 (7.43)	.901	.876	.922
Fear	2.42 (3.81)	.856	.803	.898	2.42 (3.02)	.800	.748	.844
Hostility	3.55 (3.85)	.772	.688	.839	2.48 (3.23)	.803	.751	.846
Guilt	2.49 (4.36)	.870	.822	.908	1.78 (3.11)	.881	.850	.908
Sadness	3.84 (3.90)	.797	.721	.858	2.82 (3.16)	.819	.771	.860
Fatigue	5.87 (3.28)	.633	.488	.745	7.32 (3.52)	.784	.723	.834
Shyness	2.98 (2.76)	.650	.511	.757	3.99 (2.36)	.445	.290	.573
Joviality	9.71 (8.69)	.950	.932	.965	9.49 (6.35)	.919	.898	.936
SA	7.65 (5.20)	.795	.719	.855	6.47 (4.08)	.764	.703	.817
Att.	6.08 (3.03)	.630	.483	.743	6.19 (3.31)	.797	.740	.844
Serenity	6.41 (3.00)	.760	.657	.836	7.44 (2.53)	.827	.774	.868
Surprise	2.08 (2.65)	.839	.770	.890	1.96 (2.23)	.778	.711	.832

Note. M = Means; SD = Standard deviations; α = Cronbach’s alpha; SA = Self-Assurance; Att. = Attentiveness.

7.5.4.3 Dutch Version of the Positive and Negative Affect Schedule – Extended (PANAS-XD)

The primary outcome measure of the PANAS-X was made available in Dutch (see Chapter Six for rationale, translation and validation). The PANAS-XD was completed by participants who self-selected the Dutch translation of the study after both word repetition tasks. All Cronbach's alpha statistics were excellent (≥.7; see Table 7.1) indicating high levels of measure reliability, except shyness which demonstrated an alpha coefficient of .445. For the present study, only differences in GNA and GPA subscales were investigated, with the associated subscales to be analysed if a significant difference was found.

7.5.4 Procedure

Participants were recruited from a potential Netherlands based pool (see 4.1 for details). Before the start of the experiment, participants were randomly allocated into one of two experimental conditions (the independent variable): swear word repetition vs. neutral word repetition (control) condition using the allocation concealment protocol previously outlined (4.3.1). Participants were welcomed and seated in a cubicle. After informed consent was provided, participants were connected to a BIOPAC MP36 4-channel data acquisition system, programmed to collect electrocardiogram (ECG) data. Participants' ECG data were recorded throughout the experiment (see 4.4.2). The experiment was completed on a computer, with study instructions available on the screen.

Both the Cyberball paradigm and the primary state emotion outcome measure were available in either Dutch or English. Participants self-selected whether they wished to use the Dutch (*n*=105) or English (*n*=45) version of the study. After this, participants were asked to self-nominate five words associated with tables and five swearwords, both in the participant's native language ("I would like you to write down five words you associate with tables and five swear words, both in your native language and to let the researcher know when you are done by opening the door”). After this was completed, the participant was asked to select their “favourite” word from each list and informed that these words may be recited later as part of a speech task (“Please can you select your favourite word from each list, you may be asked to recite either or both of these words later as part of a task”). At this point, the researcher checked to see whether the participant had any questions and started the Cyberball and questionnaire programme in Inquisit 5.0.

Participants then played the first game of Cyberball in which they were socially included (see 2.5.2 and 4.4.1). In this game, participants received 34% of 30 total ball tosses throughout the game. All participants completed the fundamental needs questionnaire immediately after Cyberball gameplay. The responses to this measure served as a manipulation check to ensure that Cyberball induced subjective experiences of social pain.

At this point, all participants (*N*=110) repeated the table related (control) word out loud for two minutes. An onscreen two-minute timer ensured that participants completed the task for the allotted time. I stood outside of the research cubicles where I could hear participants completing this task to verify that participants repeated the word out loud. Participants were then asked to complete the dependent measures assessing state emotion and measures of sample characteristics (see 4.4.3). Hereafter, participants played the second game of Cyberball in which they were socially excluded. In this game, participants received 10% of 30 total ball tosses. Participants completed the fundamental needs and mood questionnaire immediately after gameplay had ended.

At this point, using an onscreen timer, participants in the swear word condition (*n*=66) repeated their chosen swearword for two minutes, while participants in the neutral word condition (*n*=56) repeated their chosen table related word for two minutes. Finally, participants were asked to complete the PANAS-X/PANAS-XD. After completion of the dependent measures, participants were debriefed and thanked for their time. As HRV and PANAS-X/PANAS-XD scores are not subjective measures, outcome assessors were not blinded.

7.5.5 Analysis

Prior to the main analysis, the fundamental needs and mood questionnaire and HRV data collected during gameplay were used as a manipulation check for the Cyberball paradigm. As in Sleeger's (2017) work, a *t*-test was conducted to measure the difference between the mid-point of the scale and participant responses. Where responses fell significantly below the mid-point of the scale, the Cyberball paradigm is assumed to have elicited state social pain. Further, a repeated measures ANOVA was performed to measure whether any differences occurred in HRV between baseline and both Cyberball games.

The main analysis was conducted in two steps. Firstly, a series of repeated measures ANOVAs were conducted to examine whether there were any significant main effects on self-reported levels of state emotion between the swearword and neutral word conditions and between the inclusion and exclusion Cyberball games. The ANOVAs also allowed for the exploration of any potential interaction effects of experimental condition and level of social ostracism. Within the present study, to reduce the possibility of Type I/II errors, the present study analysed differences on the general positive (GPA) and the general negative (GNA) scales of the PANAS-X/PANAS-XD. Where a significant difference was found on either scale, the associated subscales would then be subject to analysis using repeated measures ANOVAs.

Secondly, 2x3 mixed repeated measures ANOVAs were performed to test whether there was an effect of experimental condition on HRV compared to baseline HRV and the neutral word repetition following inclusion gameplay. As the current gold-standard for short-term duration of HRV recording and analysis is 5-minutes (Laborde et al., 2017; Malik, 1996), the epochs of time analysed in the present work were baseline, ~5 minutes after the first (neutral) word repetition, and ~5 minutes after the second (neutral vs. swear) word repetition.

Sample characteristics, including demographic information (e.g., gender), levels of alexithymia, and trait ER strategy use were explored using descriptive statistics. To assess potential differences between the groups in ER skill and venting use, t-tests were used to compare self-reported levels of difficulty using the DERS, levels of alexithymia using the Toronto Alexithymia Scale – 20-items, and trait venting using the COPE (see Chapter Four for details).

The analyses were conducted using SPSS and JASP. Following Tabachnick and colleagues' (2007) guidance, responses ±3.5 SDs from the mean were identified as outliers. The main analyses were re-run without outliers. The findings for PANAS-X/XD analyses did not deviate from the findings reported herein and are not reported. Raw analytical output is available in Appendix R.

7.6 Results

7.6.2 Cyberball Manipulation Check

7.6.2.1 Fundamental Needs and Mood Questionnaire

To assess whether the social ostracism manipulation elicited an emotion, *t*-tests were performed between the average scores of the fundamental needs subscales and the mid-point of the response scale for both inclusion and exclusion games (Sleegers et al., 2017). After inclusion gameplay, the results found that all subscales except belonging increased from the midpoint (see Table 7.2) in a manner consistent with social inclusion. Correspondingly, the results showed that all subscales decreased from the midpoint in a manner consistent with experiencing social pain after exclusion gameplay. Thus, it is assumed that Cyberball was successful in eliciting positive and negatively valenced emotions in the sample.

Table 7.2. Difference average Fundamental Needs and Mood Questionnaire scales from mid-point.

	Statistics	
	Inclusion	Exclusion

Scale	t(121)	p	M	SD	t(121)	P	M	SD	$α$
Self-esteem	4.306	<.001	2.77	0.69	5.735	<.001	2.15	0.67	
Belonging	1.005	.159	2.43	0.81	16.190	<.001	1.62	0.60	
Control	2.850	.003	2.69	0.74	12.245	<.001	1.78	0.65	
Meaning	0.408	.342	2.533	0.89	11.306	<.001	1.74	0.74	
Mood	9.19	<.001	61.65	14.00	6.56	<.001	40.55	15.90	.709

Note. M = Mean score; *SD* = Standard deviation; *α* = Cronbach's alpha. Midpoint of Fundamental Needs subscales = 2.5. Midpoint of Mood subscale = 50.

7.6.2.2 Heart Rate Variability

Table 7.3 contains the descriptive statistics for HRV data collected at baseline and during gameplay. Mauchly's Test of Sphericity was violated in analyses for rMSSD, χ2(2)=17.977, p<.001, thus a Greenhouse-Geisser correction was applied to the results. There was evidence of a significant change in rMSSD HRV across the experiment, $F(1.726, 181.231)=10.745$, $p<.001$, $\eta^2_p=0.093$. Pairwise comparisons found that there was a significant decrease in rMSSD during inclusion gameplay, -0.070 (95% CI, -0.123 to -0.018), *p*=.009, and exclusion gameplay, -0.135 (95% CI, -0.204 to -0.067), *p*<.001, compared to baseline. There was also evidence that rMSSD decreased during inclusion gameplay, -0.065 (95% CI, -0.116 to -0.014), *p*=.013, compared to exclusion gameplay.

Table 7.3. Means (M) and standard deviations (SD) of log-transformed HRV and untransformed HR indices at baseline and during Cyberball gameplay.

	HRV							
	rMSSD		HF		LF:HF		HR	
Epoch	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Baseline	3.63	0.49	6.46	1.05	0.43	0.79	80.04	10.20
Inclusion gameplay	3.70	0.47	6.46	0.98	0.28	0.74	77.10	9.46
Exclusion gameplay	3.77	0.44	6.53	0.93	0.47	0.92	81.15	11.92

Note. rMSSD = Root mean square of successive differences; HF = High frequency HRV in milliseconds^2; LF:HF = Low-frequency:high frequency HRV ratio; HR = Heart rate.

Mauchly's Test of Sphericity indicated that the assumption of Sphericity had been violated in analyses using HF HRV, $\chi2(2)=12.432$, $p=0.002$, and therefore, a Greenhouse-Geisser correction was used. There was no evidence of significant differences in HF HRV across time, $F(1.797, 188.735)=12.211$, $p=.532$, $\eta^2_p=0.104$.

Turning to analysis of LF:HF HRV, the assumption of Sphericity was also violated as indicated by Mauchly's test, $\chi2(2)=12.212$, $p=0.002$. As such, a Greenhouse-Geisser correction was applied to the results. There was evidence of a significant difference in LF:HF HRV across the three epochs, $F(1.801, 189.055)=10.527$, $p<.001$, $\eta^2_p=0.091$. Pairwise comparisons found that there was a significant decrease in LF:HF HRV between baseline and inclusion gameplay, -0.143 (95% CI, -0.271 to -0.015), $p=.028$, and an increase in LF:HF HRV between inclusion and exclusion gameplay, 0.185 (95% CI, 0.009 to 0.362), $p=.040$.

When considering heart rate, there was evidence of a significant difference in heart rate between baseline, inclusion gameplay, and exclusion gameplay, $F(1.468, 154.109)=26.427$, $p<.001$, $\eta^2_p=0.201$. As Maucheley's Test of Sphericity was violated, $\chi2(2)=46.849$, $p<.001$, Greenhouse-Geisser corrected indices were reported above. Pairwise comparisons found that there was a significant increase in heart rate during baseline compared to inclusion gameplay, 2.938 (95% CI, 2.214 to 3.662), $p<.001$, and a significant decrease in heart rate during inclusion gameplay compared to exclusion gameplay, -4.045 (95% CI, -5.309 to -1.780), $p<.001$.

7.6.3 PANAS-X/XD

To test my hypothesis that swearword repetition would induce change to state emotion – specifically that general positive emotion would increase (H1) and general negative emotion would decrease (H2) – I investigated the difference in self-reported state emotion, as measured by the PANAS-X/XD immediately after both word repetition tasks. A series of 2x2 mixed ANOVA were conducted, with experimental condition (swearword; neutral word) set as the between-subjects condition and the time (post-first word repetition post-second word repetition) as the within condition. Descriptive statistics for the analysed subscales can be found in Table 7.4.

A Pearson's correlation found that the GNA and GPA scales did not significantly correlate with one another after the first task, r=.151, p=.096, or after the second task, r=.213, p=.019. This suggests that participants did not report high generalised emotionality across both positively and negatively valenced affect labels, but rather the self-reported emotions were grouped by valence.

Table 7.4. Means (*M*), standard deviations (*SD*) of PANAS-X/PANAS-XD subscales disaggregated by experimental condition.

	Swearword (*n*=66)		Neutral word (*n*=56)	
	After First Task	After Second Task	After First Task	After Second Task
	M (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
GNA	2.83 (3.37)	4.15 (4.85)	2.82 (3.30)	4.98 (6.54)
GPA	15.30 (8.06)	9.74 (6.34)	14.89 (8.08)	9.57 (7.07)

Note. GNA = General negative affect; GPA = General positive affect.

7.6.3.1 General Positive Affect

The results from a mixed repeated measures ANOVA found that there was a significant effect of time-point on self-reported levels of general positive affect (GPA), $F(1, 120)=96.515$, $p<.001$, $\eta^2_p=0.446$. Given the significance between GPA scores, a simple comparisons analysis revealed that levels of GPA significantly decreased between the first-word task and the second-word task, -5.441 (95% CI, -6.538 to -4.344), $p<.001$.

There was no evidence of a main effect of word group, $F(1, 120)=0.056$, p=.813, $\eta^2_p<0.001$, or of an interaction effect, $F(1, 120)=0.047$, p=.829, $\eta^2_p<0.001$, for GPA.

The results from the GNA and GPA subscale analyses indicate that there was no effect of word repetition on state emotion, suggesting that swearword repetition did not regulate subjectively experienced state emotion. Rather, the inclusion and exclusion gameplay conditions appear to have elicited or modified state emotion, with inclusion games associated with greater GPA and lower GNA, and vice versa for exclusion games.

7.6.3.2 General Negative Affect

A mixed repeated measures ANOVA showed that there was a significant main effect of time point, $F(1, 120)=23.862$, $p<.001$, $\eta^2_p=0.166$, on self-reported levels of general negative affect (GNA). Post hoc analysis found that there was a statistically significant increase in GNA between the first-word task and the second-word task, 1.739 (95% CI, 1.034 to 2.444), $p<.001$.

There was no evidence of a main effect of word group, $F(1, 120)=0.288$, $p=.593$, $\eta^2_p=0.002$, or of an interaction effect, $F(1, 120)=1.400$, $p=.239$, $\eta^2_p=0.012$, for GNA.

7.6.4 HRV

To test my hypothesis that swearword repetition would induce change on HRV (H3), I explored the events at baseline, and in the five minutes after each word repetition task. A series of 2x3 mixed ANOVA were conducted, with experimental condition (swearword; neutral word) set as the between-subjects condition and the time (baseline; ~5 minutes post-first word repetition; ~5 minutes post-second word repetition) as the within condition. In line with standard practice recommendations (see 4.4.2), the HRV parameters calculated were root mean standard successive differences (rMSSD), high-frequency absolute power (HF), and low-frequency/high-frequency ratio. Descriptive statistics for each parameter can be found in Table 7.5, and descriptive statistics for each epoch of study can be found in Table 7.6. All values are within the norms of short-term (e.g. 5-minute epoch) HRV norms (Nunan et al., 2010; Shaffer & Ginsberg, 2017).

As the HRV parameters demonstrated a non-normal distribution, in line with best practice recommendations (Laborde et al., 2017; Malik, 1996), a natural logarithm was applied to transform the data. As anticipated, rMSSD and HF HRV positively correlated with each other at baseline, *r*=.888, *p*<.001, after the first-word task, *r*=.847, *p*<.001, and after the second-word task, *r*=.823, *p*<.001, suggesting that both indices measured the same processes.

Table 7.5. Study overall mean and range in absolute and log-transformed values (*N*=106).

	Absolute Values				Log-Transformed Values			
	M	*SD*	Med.	Range	*M*	*SD*	Med.	Range
rMSSD	42.50	20.55	36.88	9.61-129.43	3.65	0.45	3.61	2.26-4.86
HF	861.58	1033.09	521.48	38.85-7903.49	6.27	1.00	6.26	3.66-8.98

LF:HF	2.49	2.16	1.82	0.17-12.77	0.59	0.81	0.60	-1.77-2.55
HR	79.25	9.41	78.17	57.51-123.56	-	-	-	-

Note. rMSSD=Root mean square of successive differences; HF=High frequency HRV in milliseconds^2; LF:HF=Low-frequency:high-frequency HRV ratio; HR=Heart rate; Med.=Median.

Table 7.6. Means (*M*) and standard deviations (*SD*) of natural log-transformed HRV parameters and untransformed heart rate disaggregated by experimental condition and analysed time epoch.

	Group							
	Swearword (*n*=53)				Neutral word (*n*=53)			
	rMSSD	HF	LF/HF	HR	rMSSD	HF	LF/HF	HR
Epoch	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M (SD)*	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
BL	3.59 (0.54)	6.36 (1.13)	0.53 (0.76)	79.96 (9.97)	3.68 (0.45)	6.55 (0.98)	0.32 (0.82)	81.13 (10.40)
T1	3.61 (0.50)	6.12 (1.01)	0.69 (0.73)	78.94 (9.60)	3.66 (0.40)	6.28 (0.85)	0.52 (0.78)	79.19 (9.20)
T2	3.71 (0.43)	6.18 (1.00)	0.76 (0.87)	78.28 (8.91)	3.64 (0.42)	6.13 (1.00)	0.74 (0.82)	79.00 (8.41)

Note. BL=Baseline; T1=after first-word task; T2=after second-word task; rMSSD=Root mean square of successive differences; HF=High frequency HRV in milliseconds^2; LF/HF=Low-frequency/high-frequency HRV ratio; HR=Heart Rate.

7.6.4.1 Root Mean Square of Successive Differences

Mauchly's Test of Sphericity indicated that the assumption of Sphericity had been violated, $\chi2(2)=22.983$, $p<0.001$, and therefore, a Greenhouse-Geisser correction was used. There was no evidence of a significant main effect of time, $F(1.667, 173.334)=1.382$, $p=.253$, $\eta^2_p=0.013$. As anticipated there was also no significant main effect of group, $F(1, 104)=0.020$, $p=.750$, $\eta^2_p=0.001$. There was evidence of a significant interaction effect (see Figure 7.2), $F(1.667, 173.334)=4.207$, $p=.022$, $\eta^2_p=0.039$.

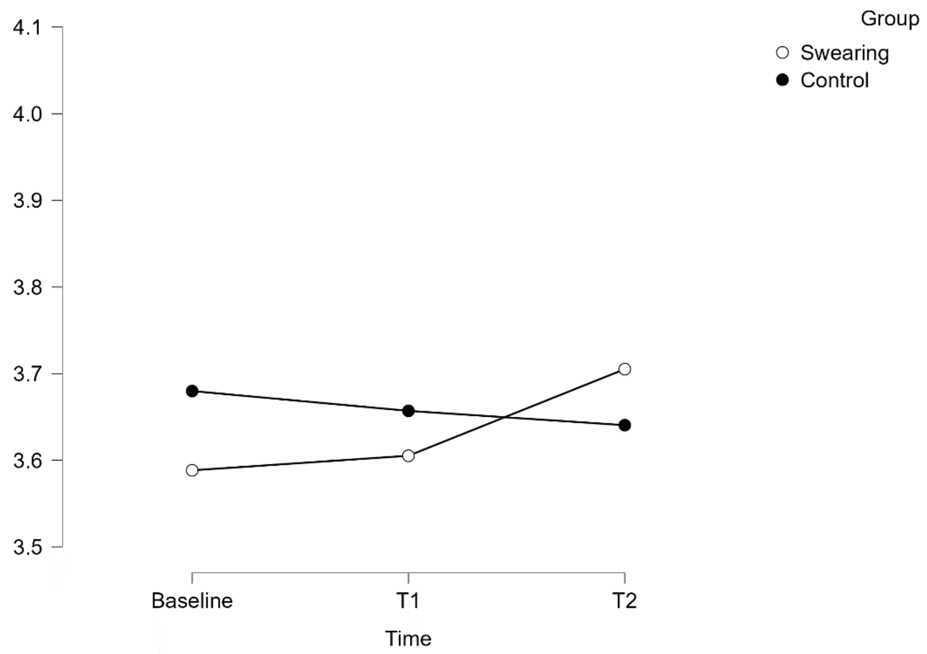


Figure 7.2. rMSSD values between the Swearing and Control groups at Baseline, Time 1 (T1), and Time 2 (T2).

Simple effects analysis showed that there was no significant difference in rMSSD value change across time points for the control group, $p=.445$, but there were significant differences in rMSSD values for the swearing group, $p=.029$.

Given the significant effect for the swearing group, a simple contrasts analysis was undertaken which compared differences in rMSSD between baseline and the first-word task, and between the first and second-word task for this group. For both analyses, a Holm correction was applied (Aickin & Gensler, 1996) and both the original and adjusted values are reported herein. There was no evidence of a significant difference in rMSSD between baseline and the first-word task for this group, $t(104)=0.425$, $p=0.671$, $p_{Holm}=0.671$. However, there was a significant increase in rMSSD between the first and the second-word task for participants who repeated a swearword, $t(104)=2.526$, $p=.012$, $p_{Holm}=0.024$.

When taken together, these results suggest that rMSSD increased after swearword repetition, but not after neutral word repetition.

7.6.4.2 High Frequency HRV

Mauchly's test suggests that the Sphericity assumption has been violated, $\chi2(2)=23.942$, $p<0.001$. A Greenhouse-Geisser correction was therefore applied. There was a significant main effect of time, $F(1.656, 172.270)=12.335$, $p<.001$, $\eta^2_p=0.106$, on HF HRV. A post hoc pairwise comparison analysis revealed that HF HRV significantly decreased from baseline to post first-word task, 0.256 (95% CI, 0.123 to 0.388), $p<.001$, and from baseline to post second-word task, 0.302 (95% CI, 0.150 to 0.455), $p<.001$. There was no evidence of a significant difference in HF HRV between the first and second-word tasks, 0.047 (95% CI, -0.053 to 0.147), $p=.354$.

In contrast, there was no evidence of a significant effect of group, $F(1, 104)=0.328$, $p=.568$, $\eta^2_p=0.003$, on HF HRV. There was no evidence of a significant interaction effect, $F(1.656, 172.270)=2.060$, $p=.139$, $\eta^2_p=0.019$.

When taken together, the results may indicate that HF HRV decreased from resting baseline in both word repetition conditions irrespective of gameplay inclusion or exclusion.

7.6.4.3 LF:HF Ratio

Mauchly's Test of Sphericity was violated, $\chi2(2)=12.176$, $p=.002$, therefore a Greenhouse-Geisser correction was applied. The results revealed a significant effect of time, $F(1.799, 187.135)=10.529$, $p<.001$, $\eta^2_p=0.092$, on LF/HF HRV. Post hoc analysis found that there was a statistically significant increase in LF/HF from baseline to post first-word task, -.177 (95% CI, -0.322 to -0.033), $p=.017$, and from baseline to post second-word task, -.325 (95% CI, -0.482 to -0.167), $p<.001$. There was also a significant increase in LF/HF HRV between the time after the first and second-word tasks, -.148 (95% CI, -0.264 to -0.031), $p=.014$.

There was no evidence that LF/HF HRV differed significantly between the groups, $F(1, 104)=1.023$, $p=.314$, $\eta^2_p=0.010$, or for any interaction effects, $F(1.799, 187.135)=1.018$, $p=.357$, $\eta^2_p=0.010$.

When taken together, the results suggest that the differences in LF:HF HRV found in the present study are likely due to individual differences in HRV or effects of the Cyberball manipulation, rather than due to the experimental conditions.

7.6.4.4 Heart Rate

Mauchly's Test of Sphericity indicated that the assumption of Sphericity had been violated, $\chi2(2)=38.722$, $p<0.001$, and therefore, a Greenhouse-Geisser correction was used. There was evidence of a significant effect of time on average heart rate, $F(1.523, 158.373)=6.415$, $p=.005$, $\eta^2_p=0.058$. A simple comparisons analysis indicated that average heart rate decreased significantly from baseline to post first-word task, .979 (95% CI, 0.162 to 1.797), $p=.019$, and from baseline to post second-word task, 1.405 (95% CI, 0.442 to 2.369), $p<.001$. There was no evidence of a significant difference in average heart rate between the first and second-word tasks, 0.426 (95% CI, -0.134 to 0.986), $p=.134$.

There was no main effect of group on average heart rate, $F(1, 104)=0.349$, $p=.556$, $\eta^2_p=0.003$, or for any interaction effects, $F(1.799, 187.135)=3.075$, $p=.063$, $\eta^2_p=0.029$.

When taken together, these results suggest a deceleration of heart rate over the course of gameplay. Both inclusion and exclusion Cyberball games have been demonstrated to lead to a decrease in HR (Begen & Turner-Cobb, 2015; Gunther Moor et al., 2010; Iffland et al., 2014), as such these findings may be explained by the manipulation.

7.6.1 Sample Characteristics

7.6.1.1 Toronto Alexithymia Scale – 20-items

The independent samples *t*-test revealed no significant differences in levels of alexithymia between the swearword repetition group (*M*=43.42, *SD*=11.99) and the neutral word repetition group (*M*=46.16, *SD*=13.52), *t*(120)=-1.185, *p*=.239, *d*=-.215. The results suggest that, on average, the sample do not suffer from alexithymia – values ≤51 are interpreted as non-alexithymia – as such it is assumed that the emotion elicitation procedure is unlikely to be impacted at a group level by participant difficulties in experiencing or understanding emotion.

7.6.1.2 Difficulties in Emotion Regulation

The independent samples *t*-test revealed no significant differences in self-reported difficulties in emotion regulation (DERS), as measured by DERS total scores, between the swearword repetition group (*M*=90.76, *SD*=25.08) and the neutral word repetition group (*M*=90.30, *SD*=22.391), *t*(120)=0.105, *p*=.917, *d*=.019. These results suggest that participants in both groups are equally skilled in regulating emotion.

7.6.1.3 COPE Inventory – Focus On and Venting of Emotions Subscale

The independent samples *t*-test revealed no significant differences in habitual venting of emotions, as measured by scores on the Venting subscale of the COPE Inventory, between the swearword repetition group (*M*=11.50, *SD*=2.86) and the neutral word repetition group (*M*=12.27, *SD*=2.75), *t*(120)=-1.504, *p*=.135, *d*=-.273. These results indicate that participants in both groups use behaviours that express, or *vent*, emotions similarly irrespective of experimental condition, and no habituation effects of venting should differentially impact either group.

7.7 Discussion

In the qualitative study (Chapter Three), participants described a belief that swearing can regulate emotions. The present experiment examined indices of subjective experiential state emotion and HRV – a psychophysiological index of ER (Holzman & Bridgett, 2017) – after repeating a neutral or swear word to assess whether the observed effects are consistent with the findings of the prior study. It was hypothesised that swearword repetition compared with neutral word repetition would result in an increase in positive emotion (H1) and a reduction in negative emotion (H2) as measured by the PANAS-X (Watson & Clark, 1999), and an increase in HRV (H3).

The discussion will cover both the PANAS-X and HRV results in turn.

7.7.1 PANAS-X/XD

The results found that there were no significant differences in self-reported levels of GPA (H1) or GNA (H2) between the groups repeating either a swear- or neutral word after social exclusion. Thus the theory that swearword repetition would regulate subjective state emotion was not supported. I believe that the demonstrated effect of time – that GNA increased and GPA decreased after exclusion gameplay compared to inclusion gameplay – likely evidences the effect of Cyberball mediated ostracism on state emotion and the lack of effect impacting state emotion from the word repetition task.

Cyberball is well evidenced in inducing high levels of social pain (see 2.5.2 for discussion). These effects have previously been measured using the PANAS-X, yielding similar results to the present work. For example, in a study (Reis et al., 2021) where 269 Australian adults were subjected to Cyberball gameplay exclusion and then completed the PANAS-X, participants reported higher levels of GNA and lower levels of GPA compared to baseline levels. According to the temporal model of ostracism (Williams, 2009), the emotional impact of Cyberball exclusion may be prolonged. Williams (2006) theorised that the induced social pain may persist when tasks impede the recovery process. There is some evidence for this assertion. In studies that measured self-reported emotion on the PANAS and the Fundamental Needs and Mood questionnaire, there was evidence that the effect of Cyberball exclusion could last for up to 55 minutes in 74 and 438 undergraduate students from the Global North (Buelow et al., 2015; Zadro et al., 2006 see 1.2 for discussion on Global North/South), with the effects more pronounced in individuals suffering from high levels of trait anxiety and when cognitive tasks were completed, such as the Digit Span subtest where participants repeat an increasingly lengthy string of numbers. Buelow and colleagues (2015) theorised that when attention is diverted away from the self, such as through completing repetitive tasks, the individual is unable to regulate the subjective affective experience associated with social pain. Thus, it is reasonable to suggest that the repetition of a word may similarly have served to prolong the effect of Cyberball exclusion on subjective state emotion. As the present work is the first to measure the impact of swearword repetition on state emotion, as opposed to measures of pain, it is difficult to fully elucidate why there was a lack of effect of swearword repetition compared to neutral word repetition in the present study.

7.7.2 HRV

It was hypothesised that HRV index values would increase following swearword repetition and that there would be no effect of neutral word repetition on HRV (H3). The results from the analysis of HRV found conflicting results. The rMSSD indices were demonstrated to increase in participants who repeated a swearword after exclusion gameplay when compared to baseline and inclusion gameplay rMSSD indices. There was no evidence of an effect on rMSSD for participants who repeated a neutral word after exclusion gameplay. The HF and LF:HF HRV indices found a decrease in index values across time, but not between the experimental conditions. As rMSSD is the primary HRV outcome variable (see 4.4.2), I will discuss this result first. The results from HF and LF:HF HRV analyses will then follow.

7.7.2.1 rMSSD

The findings of increased rMSSD in participants who repeated a swearword when compared to those who did not after social ostracism are in-line with prior findings in the qualitative study of the present thesis. I believe that this result provides support that swearword production fulfils emotion regulatory functions, and I will discuss this in light of theories from social neuroscience and cognitive energetics theory. It is important to note that the succeeding discussion points require further substantiation through replication efforts.

rMSSD is theorised to primarily index self-regulation (Reynard et al., 2011). I argue that the demonstrated increase in rMSSD index values may explain the ineffable relief experienced after swearword production, as described by participants in the qualitative study (Chapter Three). While this may be a novel hypothesis, this inference may be best understood in the light of theories from social neuroscience. McCall and Singer (2012) argue that positive affective feelings are associated with parasympathetic activity when the individual is undertaking goal orientated and quiescent (e.g. restful; homeostatic or allostatic supportive) behaviour. I would suggest that speech-based ER is a goal-orientated and quiescent behaviour. The behaviour aims to modify an emotion's trajectory and the behaviour itself does not require high-level energy resources to complete, thus sustaining homeostatic and allostatic functions. I suggest that the affective qualities of the feeling states associated with such behaviours are best described as calmness, an inference which mirrors the findings of Study One in the present thesis where swearword production was described as inducing a subjective experience of serenity, as exemplified in the following quote: "it makes me feel more calm" (FGD1 #3757). Thus, the documented increase in rMSSD may be experienced as a feeling of calmness or contentment by the speaker.

It is notable, however, that the affective experience associated with quiescent motivational behaviours and PNS activity has been theorised to not map directly onto any specific emotion population (Duarte & Pinto-Gouveia, 2017) and may thus be difficult to measure using self-report instruments. The lack of coherence between these behaviours and subjective state emotion may be supported by the findings of Study One, where the effects of swearword production were described as both ineffable and positive, as in the following quote: "I just feel like when I swear I can just let everything out. It just feels- Like I can't even describe it" (SSI #6162). This hypothesis may also help further explain the lack of effect in the PANAS-X/XD results, as the measure may not have been nuanced enough to capture ineffable affect or specific emotions related to calmness.

The suggestion of an rMSSD mediated ineffable feeling of calmness may provide insight into why swearword production is a pervasive behaviour in response to/in the regulation of emotions. This may specifically be understood in terms of the trade-off between affective motivation and cognitive/homeostatic cost. Cognitive energetics theory (CET; Milyavsky, et al., 2019) - a model which clarifies the internal and external affordances which motivate ER strategy implementation - posits that the likelihood of specific ER strategy implementation occurring is a function of two opposing influences: the motivation to implement the strategy, and the cognitive costs – and, if including the TCE (Barrett, 2017b) and McCall and Singer's (2012) theory, potentially allostatic costs – of strategy implementation. When swearing, the eliciting affective experience is likely to provide a high affective motivation. That is, as the stressor causes psychological distress, there is a high motivation for the agent to regulate the associated negative emotionality. Similarly, while remediating the actual stressor may require high cognitive and interpersonal costs, swearing may provide an avenue through which PNS regulation and a core affective experience of calmness can occur at low cognitive costs. That is, swearing is unlikely to require high degrees of psychological resources, such as inhibitory control, or physiological energy resources. Thus, the barrier to entry is low but the regulatory gains are potentially high when using swearing as a source of ER. This trade-off between motivation and cognitive cost, according to CET (Milyavsky et al., 2019), may be why swearing remains a ubiquitous ER behaviour following psychologically distressing events.

The current study evidenced that swearword production may increase rMSSD following social ostracism. Thus, it may be argued that this indicates that the likelihood of further adaptive outcomes related to swearword use is not equal to zero. Hence according to ER predictive processing models, it is reasonable for swearing to be employed based on adaptive prior experiences. When evidence from predictive processing models are combined with CET (Milyavsky, et al., 2019), it is apparent why swearing is used as ER – even when doing so violates models of rational decision making (Coifman & Summers, 2019). It is apparent that engaging in swearing is a low cognitive cost/highly motivated behaviour which, according to prior learned experience, likely has adaptive affective outcomes. Hence, the present thesis argues that swearing is an ER strategy – as evidenced by increased rMSSD – underpinned by models of emotion theory (Hoeman, et al., 2020), emotional decision-making (Coifman & Summers, 2019), social neuroscientific theory (McCall & Singer, 2012), and CET (Milyavsky, et al., 2019).

The results are consistent with wider literature that demonstrated that swearword production yields greater pain tolerance compared to neutral word production (Philipp & Lombardo, 2017; Piggot & Stephens, 2017). Vagally mediated indices of HRV, such as rMSSD, have been found to significantly correlate with cold-pressor pain tolerance in 33 female undergraduate students from the Netherlands (Koenig et al., 2015), with individuals with increased HRV being able to tolerate the painful stimulus for longer. As the mechanisms underlying physical and social pain and pain management are assumed to overlap (see 2.5.2 for discussion), if swearword production increases rMSSD, it is reasonable to suggest that such an increase may also improve social pain tolerance. However, further research is required which replicates the present work assessing the effects of swearword production on vagally mediated HRV indices before this theory is supported.

7.7.2.2 HF and LF:HF HRV

The results found that HF and LF:HF HRV decreased significantly from baseline across both experimental groups and that this effect is likely due to inherent differences across the analysed epochs. This result is particularly surprising as the results diverge in direction from those found in the rMSSD analyses. As previously discussed (see 4.4.2), rMSSD and HF HRV are theorised to measure the same construct and should, therefore, agree in their value direction. Similarly, LF:HF is theorised to index sympathovagal balance, with lower values representing parasympathetic nervous system dominance and higher values reflecting sympathetic nervous system dominance. As such, where rMSSD increases, there should be a decrease in LF:HF values. Such a decrease was not demonstrated in the present results.

I suggest that the metronomic repetition of speech may have induced respiratory variations in the frequency band of HRV, thus leading to the demonstrated increase in HF and LF:HF HRV. As discussed previously (see 4.4.2), HF and LF HRV reflect the rhythmic fluctuations in heart rate in the respiratory band and is, therefore, highly susceptible to the influence of respiration (Thayer et al., 2011). In the present study, the metronomic repetition of a single word may have resulted in regular period patterns in the respiration cycle. That is, through repeating a single word, the pattern of respiratory activity may have been modulated to follow a specific and regular rhythm. I suggest that this rhythm may have thus influenced HF HRV, resulting in the surprising index variation between HF, LF:HF, and rMSSD.

This hypothesis is not without support in the literature. Speech repetition has been associated with periodicity. When events are periodically expressed through speech, speakers will regularise the frequency and pitch of the spoken event (Port, 2003). Respiratory inspiration, expiration, and breath cycle duration are coordinated during speech to allow for speech production (Wlodarczak & Heldner, 2020). When speech is repetitive, it follows that respiration will also follow a repetitive pattern.

Previous research (Russell et al., 2017) which explored the effect of controlled, repetitive breathing in 40 North American undergraduate students found that HF HRV decreased compared to baseline as a result of breath modulation. However, rMSSD indices did not change as a result of the metronomic breathing. Similarly, when 17 North American adults' ECG data were collected during normal and paced breathing, LF:HF HRV indices increase significantly in the paced breathing condition (Aysin & Aysin, 2006). These results are further supported by evidence from two studies that reported HF and LF:HF index values (Bhagat et al., 2017; Raghuraj et al., 1998). These studies assessed the difference in HF and LF:HF HRV between normal and slowed breathing in 12 Indian adults. The results of both studies demonstrated a decrease in HF HRV after slowed breathing when compared to normal breathing. Thus, it seems reasonable to suggest that the decrease in HF and LF:HF HRV in the present work is due to respiratory modulation, rather than the experimental paradigm or conditions.

7.7.3 Limitations

As in all empirical work, there are limitations to this study that must be discussed. As this is only a single study, the results and discussion presented herein must, therefore, be treated cautiously and require replication for the effects to be substantiated. Indeed, the significant results may be due to non-meaningful noise in the data, Nonetheless, the findings from the experiment triangulate with some of the findings from the qualitative study (see 3.3.3.4) and peripheral theoretical frameworks (discussed above), which suggests that this study may serve as initial evidence that swearing may fulfil emotion regulatory functions. These results may therefore be used as a catalyst for further exploration in swearing related phenomena.

Ecological validity is also a concern for this study. While this limitation applies to most psychology experiments, it is still important to note. The present work replicated the procedure used in all research projects investigating the effect of swearword production on social pain, with specific words repeated in a metronomic fashion for a short period. While the present paradigm was appropriate in capturing the effects of word repetition in a controlled laboratory environment, it was a highly stylised task that may not fully represent speech production in everyday life. However, if the study had deviated from a well-evidenced paradigm, the results of the study may have been increasingly more difficult to interpret or relate to extant work. Due to the established paradigm use, this work may serve as a starting point for further exploration assessing the parameters of how and why swearword production induces change to emotion components. For example, understanding whether rMSSD increases are dependent on swearword repetition or singular swearword utterances would be instrumental in understanding the functions fulfilled by swearword production. Without the present work, such an investigation could reasonably not occur. As such, despite this limitation, I believe the present study provides a framework from which future research can be based.

7.7.4 Conclusions

The present study has served to answer some of the basic questions related to how swearword production may regulate state emotion. The results for self-reported state emotion affirmed the null hypothesis, demonstrating no differential effect of word repetition after social exclusion. The present research provided evidence that swearword production induced regulation of psychophysiological systems, as indexed by rMSSD change. Theoretical frameworks from social neuroscience (e.g. McCall & Singer, 2012) suggest that changes to PNS activation, such as the increase in rMSSD in the present work, are accompanied by feelings of serenity that are difficult to describe. If true, the present results triangulate with those from the Qualitative study (Chapter Three) contained in the present thesis that swearword production yields an ineffable calmness. However, these results must be replicated before being treated as a robust reflection of actual effects.

It is important to note at this point that the divergence in degree of significant in effects between subjective and physiological measures is not problematic according to ER theory (Gross, 2015). ER can influence any of the three components of emotion – specifically the subjective experiential, physiological, and behavioural elements of affectivity – independently. According to the PMER (Gross, 2015), it is not assumed that regulation will influence all components equally or at all. As such, the lack of evidence of an effect on PANAS-X values is not seen as problematic when an effect was found on the psychophysiological index of rMSSD.

Thus, the present study concludes that swearword repetition may fulfil emotion regulatory functions on the psychophysiological component of the emotion of social pain. However, further research is required to replicate and substantiate the present findings. The present work provides a significant contribution to the literature in its efforts to answer some of the outstanding basic questions related to the actual ER behaviours used in non-clinical populations in everyday life; doing so in a way that is methodologically rigorous and theoretically based. Future research can use this study as a methodological or conceptual basis from which more mechanistic models and experimental studies can be formulated in relation to the phenomena underpinning swearword production. The following final chapter will revisit all four studies to consider how the findings compare and contrast with each other, the wider literature, and what novel conclusions can be drawn from this work.

Chapter Eight: Thesis Discussion

The present thesis adopted a mixed-methods approach to investigate if and how speech-based emotion regulation (ER) strategies moderate emotions elicited by everyday events, specifically social ostracism, in non-clinical populations. The available literature was approached critically and this critique informed how the present constellation of studies were developed and undertaken. This included a thorough reading of emotion theory literature and, using the Theory of Constructed Emotion (TCE; Barrett, 2017b) and the Process Model of Emotion Regulation (PMER; Gross, 2015), drawing predictions of how spoken language behaviours may fulfil emotion regulatory functions. Within this final chapter, I will summarise the aims, methodological approaches, findings, and theoretical contributions from the three empirical studies as stand-alone projects in reference to the previous literature (8.1) and subsequently synthesise these together to provide a holistic overview of speech-based ER (8.2). Following this, the alternative explanations (8.3), strengths (8.4), limitations (8.5), and implications (8.6) will be outlined before drawing the thesis to a close (8.7).

8.1 Summary of the Thesis

The overall aim of the thesis was to assess whether speech behaviours could regulate emotions in response to everyday events. To date, the available literature had concentrated on specific ER strategies for which there is limited evidence demonstrating extensive use in the everyday lives of non-clinical populations, such as cognitive change. Such a myopic focus on specific sets of (potential) regulation strategies has arguably constrained what is known about everyday ER practices. Further, as many affective scientists adopt a deficit model approach to lay individuals' knowledge of emotion – that is, it is assumed that without scientific or philosophical training an individual is unable to have insights into emotion processes – research programmes have previously been dictated by the assumptions of the academy. As such some of the basic questions about whether, how, and why ER occurs in daily life had yet to be answered.

The present thesis bridges a gap in our knowledge by answering some of these questions through specific investigations of perceptions and actual instances of ER and the associated efficacy of such strategies in everyday life. The aims of this research were to (1) explore lay individuals' understandings of emotion and ER; (2) examine which speech behaviours are used to regulate emotion (i.e. venting, swearing); (3) investigate individuals' experiences of the parameters or affordances which are perceived as promoting or constraining strategy implementation and efficacy; and (4) to assess the regulatory efficacy of venting and swearing in line with the TCE (Barrett, 2017b) and the PMER (Gross, 2015). The results provide a basic framework from which future response-focussed ER research can be operationalised.

To address the aims of the thesis, a mixed-methods approach was adopted to gain a comprehensive understanding of the investigated phenomena and to triangulate the findings between differing research approaches to produce internally consistent inferences and conclusions. This thesis is comprised of four empirical studies. The studies and key findings are summarised below.

8.1.1 Study One: A Qualitative Interview and Focus Group Study

This programme of research began with a qualitative exploration into instances of emotion and ER in everyday life, as well as the types, contingencies, affordances, dynamics, and beliefs related to these experiences. The results informed the operationalisation and design of the subsequent quantitative paradigms. The sequential (i.e. results from Study One informing the design of Studies Two and Four), exploratory approach allowed a comprehensive overview of emotion and regulation, which included a deepened understanding of the fluctuations in strategies based on the available contingencies, to be derived; specifically, Study One allowed for the selection of behaviours (venting; swearing) that would be experimentally tested in Studies Two and Four.

Returning to the qualitative data, three overarching themes were identified: Emotions Outside of Speech (subthemes: Core-components of Emotion; Positive and negative, high and low intensity; Story about Who I Am; and You Can Learn that); Speech Gives Emotion Form (subthemes: Narrative Structure; I Can Understand and Express It); and Speech Regulates Emotion (subthemes: It's Not Just Speaking Out Loud; People Just

Want To Know That Somebody's Listening; Talking Doesn't Change Reality; and Pressure Valves).

The first theme focused on participants' first-order experiences and perceptions of emotion. Previously, emotion research had adopted a deficit model of public understanding of emotion qualia (Mikulak, 2011). In contrast to the deficit model approach, Study One demonstrated that lay individuals have complex and nuanced understandings of emotion phenomena in a manner that can (a) clarify and refine emotion theory, and (b) serve as the basis for constructing quantitative models of emotion. For example, participants described experiences and perceptions of emotion and ER which more closely mirrors populations perspectives of emotion, such as the TCE (Barrett, 2017b), than discrete perspectives, such as Basic Emotion Theory (Ekman, 1992; see 1.2).

Population perspectives hold that specific linguistic referents (e.g. happiness) refer to a population of highly variable instances of neurophysiological events (Barrett, 2022); meaning that an emotion is a category of instances that are culturally and contextually diverse, rather than being discrete, biologically based events. A vast degree of variation in emotional life was discussed by participants. There was an orientation towards understanding variability to occur both within an emotion conceptual category based on the available context and contingencies (e.g., fear; Chapter 3, p.26), and between emotion categories. This finding supports deductions from the TCE that there are multiple levels of within- and between-category instances (see 1.2.2) and Study One was the first to evidence such variability in the actual lived experiences of non-clinical populations. As such, one of the major contributions to knowledge from Study One is its synthesis of qualitative 'non-scientific' perspectives and scientific perspectives on emotion; an endeavour which has previously not been undertaken, to elucidate and enhance emotion theory or empirical paradigms.

Furthermore, there was a widely held understanding amongst my participants that the propensity to experience any given emotion is governed by the availability of learnt conceptual groupings and associated linguistic referents, rather than due to the existence of natural kind categories of emotions. Participants described how, without available linguistic markers or the social consensus for emotions, understanding or expressing information relating to emotions would be impossible. This was particularly clear in the instance of *schadenfreude* (Chapter 3, p.25) – an emotion characterised by the unexpected thrill of another's misfortune (Watt-Smith, 2016) – where, despite having recognisable features (e.g., core affect signal data, contextual cues), the participant reported that the internal emotional state was difficult to understand and express prior to acquisition of a conceptual grouping and associated linguistic referent. *Schadenfreude* is a German word for which there is no direct translation in English. According to constructionist accounts, emotion concept development occurs within a social context, thereby shaping transmission along cultural lines. Such transmission has been demonstrated to occur through specific interventions in children (e.g., Hoemann et al., 2019). The present thesis extends this approach as it evidences how a concept (*schadenfreude*) had been developed as a conceptual category and integrated into actual lived experience in adults after naturalistic social concept transmission and without explicit intervention. The finding that participants understood linguistic references whose meaning has a social consensus allowed emotions to be categorised into social reality based on perceptual groupings evidences theoretical suppositions from the TCE (Adolphs et al., 2019) By demonstrating that lay individuals can provide accounts and perceptions of emotion qualia with specificity and sophistication, this research is the first of its kind to propose using lay interpretations to guide empirical paradigms and for theory refinement, in line with psychological constructivist approaches (see 2.2 for overview).

The second and third themes explored the interplay between speech and emotion, as reported by participants. Study One explored the role speech plays in emotion events and regulation. Previous research had provided evidence that speech occurs during or following 80-95% of emotional events but, until now, had largely been conceptually ignored. Any prior investigations into the effect of speech on emotions were not well operationalised or measured (see 1.3.3). Venting and swearing – two of the most prevalent behaviours described by participants – had, up till now, been underrepresented in the field and had been described as wholly maladaptive behaviours which cause greater emotional and social distress (see 5.1 and 7.1 respectively). The results of the qualitative study stand in stark juxtaposition with the aforementioned empirical assumptions. Both venting and swearing are suggested, by participants, to provide relief from intense emotions and regulate emotions quickly. This finding is one of the major contributions of the study to the field of emotion research. In the present thesis, both venting and swearing were believed by participants to be functional behaviours that allow personal goals to be met. Both behaviours can be used deliberately (e.g. to reduce stress at work; see 3.3.3.4) or as a reflexive act (e.g. reduce anxiety in response to an event in a football match; see 3.3.3.4); meaning that venting and swearing can be implemented flexibly and meet contextual affordances.

According to both the TCE (Barrett, 2017b) and the PMER (Gross, 2015; see 1.3.1), ER strategies are flexibly implemented based on the individual's regulatory goals and the available contextual cues. Hence, any given regulatory strategy can be used as an explicit, conscious, and effortful behaviour or implicit, unconscious and automatic regulation depending on the needs of the individual or situation (see 1.3 for discussion). The reports of how venting and swearing are used in everyday life appear to agree with the theoretical stipulations on PMER as both behaviours could be used implicitly or explicitly and use was governed by the situational context (see 8.2 for discussion on similarities/differences of these behaviours). By demonstrating this, the present body of work suggests that venting and swearing are adaptive ER strategies, in line with the PMER (Gross, 2015). Both behaviours seem to provide adaptive emotional outcomes which are appropriate to the situation, the given affordances, and the regulatory goals of the individual. The evidence that venting and swearing are ER strategies led to the focus of the research programme from Chapter 5 onwards, since it seemed that an incongruence existed between the extant published assumptions – namely that they are both maladaptive behaviours which lead to worsened psychological outcomes – and lived experiences of venting and swearing.

The first two aims of the thesis, to explore perceptions and actual incidences of everyday speech-based ER and to construct a framework sensitive to contextual cues, was achieved in Study One. This study confirms that spoken language behaviours are used reflexively and deliberately to regulate state emotion in non-clinical populations. Thus, these behaviours must be further investigated to better model ER strategy use and efficacy.

8.1.2 Study Two and Four: Experimental Venting and Swearing Studies

Having provided a qualitative rationale for the programme of research, the primary objective of the quantitative studies was to evaluate whether venting and swearing influenced emotion response systems, and to deduce a potential mechanism underlying any effect. Thus, these studies were designed to achieve the third aim of the thesis: to explore whether venting and/or swearing are efficacious speech-based ER strategies.

The available empirical literature exploring the effect of either venting or swearing was sparse (see Chapters Five and Seven respectively). There is, however, a common thread in the critically reviewed work: both venting and swearing are suggested to be maladaptive behaviours that yield increased psychological distress or negative social outcomes (see 8.2 for further discussion). The given evaluation for either behaviour is contrary to that found in Study One of the present research. As such, the present studies were designed to explore the effect(s) of venting and swearing on state emotion to dispel these myths or to better understand the underlying mechanisms for the hypothesised negative associated outcomes.

To assess the impact of either speech behaviour on state emotion, social pain was induced in participants (see 2.5.3 for discussion). Social pain is theorised to be a high-intensity affective state which is demarcated by psychological distress (Williams, 2009). According to the social-physical pain overlap theory (Eisenberger, 2012), strategies which regulate physical pain should be similarly efficacious in regulating social pain and *vice versa*. When these two hypotheses and the findings of Study One are synthesised together, it follows that social pain induction may be an appropriate paradigm with which to assess the effect or lack thereof of venting or swearing on state emotion.

Hence, both studies employed an experimental design wherein participants played Cyberball as a means of eliciting social ostracism to assess how speech-based ER may regulate emotion. Through using multi-modal measurement of state emotion, the present research aimed to index change in both subjective experiential and physiological components of emotion while assuming independence of any observed variation. Such an approach is theoretically informed by both the TCE (Barrett, 2017b) and PMER (Gross, 2015); specifically that it assumed variation and independence between emotion component modification. Further, multimodal approaches are considered best practice for emotion measurement (Barrett and Westlin, 2021). However, there were few studies that incorporated multimodal measurement practices. As such, both studies provide a significant contribution to the literature by demonstrating both the feasibility and strengths of this approach.

In both studies, it was hypothesised that both venting and swearing would act as speech-based ER and hence would impact upon either the subjective experiential or physiological aspects of emotion in line with the individual's regulatory goals. The two studies will now be discussed in turn.

In Study Two, participants read either a venting or descriptive script aloud after exclusion Cyberball gameplay. Between-group differences for HRV and PANAS-X scores were assessed using independent *t*-tests and repeated measures ANOVAs. Contrary to expectations, this experiment did not detect any evidence of an effect of venting on the HRV indices or PANAS-X responses.

While the study found null results, the present analyses are notable as they may document a lack of negative outcomes after venting. Previous research had connected self-reported habitual venting use with negative emotional outcomes using correlational analyses (Brown et al., 2005). Venting is suggested to be indicative of either ER failure, in that the individual is unable to regulate, or rumination based up-regulation of negative emotion. The results of the present study did not evidence any increase in negative emotion or decrease in positive emotion, nor an increase in sympathetic nervous system activation (the fight-or-flight response) after venting – all of which would suggest maladaption. While this may simply document the absence of evidence and not evidence of absence, as the results did not cohere with the hypothesis that venting is maladaptive, I suggest that venting may not necessarily be deleterious and alternatively may influence other intrapersonal variables during venting-mediated self-regulatory events.

Comparison of the methodology used with those of other studies may provide insight into the present results. Burchard (2001) suggested that, from his qualitative analysis, venting must contain a social element. A similar finding was available in the results of Study One (see 3.3.3.2) where participants identified the swearing partner as being key to the regulation process. That is, venting must occur as part of social interaction and the chosen partner is often selected carefully based on the characteristics of the stressor and the relationship between both the venting party and the partner. As such, in an attempt to curate an internally reliable experiment, the study may have instead created a context lacking in external validity and which did not adequately reflect actual everyday experiences of venting use. Further, where a social element was included within an empirical paradigm, venting was evidenced to have adaptive outcomes on state emotion after the elicitation of negative state emotion (Nils & Rimé, 2012). Thus, it seems possible that the lack of effect in the present work may be due to the lack of social dimension within the venting procedure.

In Study Four, participants repeated either a swear- or neutral word for two minutes after Cyberball gameplay. Within- and between-group differences in HRV and PANAS-X/PANAS-XD responses were assessed using a series of repeated measures mixed ANOVAs.

The most obvious finding to emerge from the analysis was that participants who repeated a swearword had increased HRV as indicated by time-domain measures (i.e. root mean square of successive differences; rMSSD) and frequency-domain measures (e.g., high-frequency heart rate variability). In line with these results, in the ECG data, participants who swore exhibited greater parasympathetic nervous system activation (rest-and-relaxation response) compared to participants who repeated a neutral word, as indicated rMSSD. In comparison, there were no significant differences found between the groups in PANAS-X/PANAS-XD subscale scores consistent with a lack of systematic effect on subjective experiential affective functioning.

According to the Neurovisceral Integration Model (NIM; Thayer & Lane, 2000; see 2.5.3), HRV may be used as a proxy measure to assess the timing and magnitude of an emotion response and regulation. *In precis*, increases in HRV are associated with greater vagal and parasympathetic nervous system (the rest-and-relaxation response), whereas decreased HRV is associated with greater sympathetic nervous system activity (the fight-or-flight response). The results of Study Four showed that participants who repeated a swearword exhibited higher rMSSD HRV than participants who repeated a neutral word, it is inferred that swearing provided regulatory functions for physiological arousal. There was no evidence that swearing moderated the subjective experiential aspect of emotion. The results support the hypothesis that swearing regulates state emotion by influencing the physiological component of an emotion, specifically through increasing rMSSD.

The results found that swearing modified the physiological component of an emotion while venting did not appear to regulate emotion. I will firstly consider this from a theoretical point of view and then from a paradigmatic point of view. Firstly, from the perspective of the PMER (Gross, 2015), one explanation for the asymmetry in emotion component regulation may be due to differential goal orientation and motivations associated with each behaviour (e.g., Tamir et al., 2020). Regulatory goals refer to desired end states (Fishbach & Ferguson, 2007), which may lead to changes in state emotional tone (e.g. toward positive emotionality), higher-order processes (e.g. improved emotional wellbeing), and/or lower-order processes (e.g. think positively). Within the framework of PMER, ER choice is argued to be a form of decision making; decision making which governs regulatory strategy implementation and is determined by the strategy's cognitive costs, eliciting context, and the individual's regulatory goals (Suri et al., 2018).

Accordingly, as discussed in Chapter Seven, the documented effect of swearword production on rMSSD may be related to models underpinned by Cognitive energetics theory (CET; Milyavsky, et al., 2019). CET holds that when an individual is deciding whether to implement a regulatory strategy, the cost to resources (e.g. allostatic costs; McCall & Singer, 2012) is compared to the motivational desire experienced. Cyberball, the emotion elicitation paradigm used, is suggested to induce a high-intensity core affective state which is associated with correspondingly high levels of motivation to remediate the subjectively experienced state (Williams, 2009). Harmoniously, swearword production requires little cost to available resources. Thus, in line with CET, the results may suggest that swearword production is a low-cost but potentially high-reward strategy that may best regulate the physiological emotion response systems. However, the study is limited as participants repeated a word for 2-minutes and thus the external validity of the study is poor as it is unlikely that an individual would repeat a specific word for the entire duration of two minutes. As such, it is unclear whether my interpretation or results would replicate in more externally valid scenarios, such as a single utterance. Regardless, these findings raise intriguing questions regarding the nature and extent of swearword production's effects on physiology and how model decision-making processes are integrated into emotion regulatory processes.

Although this framing is consistent with the PMER (Gross, 2015), CET (Suri, et al., 2014), NIM (Thayer & Lane, 2000), and the TCE (Barrett, 2017b), further work is needed to develop this hypothesis and to test the parameters (e.g. affordances) which render the outcomes for each behaviour as adaptive or maladaptive (see 8.6 for discussion). The evidence should be approached critically as these studies are the first of their kind to demonstrate adaptive outcomes of swearing in response to social ostracism. While the studies were adequately powered and employed robust and theoretically informed methodologies, any effects should be conceptually and directly replicated prior to claim substantiation.

Thus, the third aim of the thesis, to explore whether venting and/or swearing provide adaptive outcomes as speech-based ER, was achieved in Studies Two and Four. These studies provided insight into how venting and swearing may influence state emotion and, arguably, provided evidence that both spoken language behaviours yield adaptive emotional outcomes.

8.1.3 Study Three: PANAS-XD

Study Three documented the translation and validation of the Dutch version of the PANAS-X (PANAS-XD). The analyses showed that the PANAS-XD had (a) two-factor structure – positive and negative valence aligning directly to the theoretical conceptualisation of latent emotion constructs outlined by Watson and Clark (1999), (b) high-levels of internal consistency as indicated by Cronbach’s alpha, (c) adequate factor solution discriminant validity, and (d) divergent validity mostly in line with prior work connecting trait emotion states and personality factors. Due to the demonstrated validity of the measure, I am confident that the PANAS-XD provided a reliable and valid measurement of perceived state emotion in Study Four.

This chapter uniquely contributes a scale for measuring state emotion in native Dutch speakers. Although there are some existing scales that do this, they are largely unidimensional or are not necessarily appropriate for use by research underpinned by the TCE (Barrett, 2017b). Future research can use the PANAS-XD to measure state emotion in Dutch native speakers and can reliably aggregate the results with the results taken from samples who complete the original PANAS-X.

8.2 Synthesis of Findings

The present thesis has started to bridge the available knowledge gap by providing answers to some of the basic, but unanswered, questions of ER research: how and why speech-based ER occurs in everyday life. This section will synthesise the results of Studies One, Two, and Four and I provide my interpretations, inferences, and speculations from the synthesis herein.

When appraising the three studies as a whole, the findings from these three studies provide empirical evidence for integrating lay individual understandings of complex phenomena into theory-driven research. Practically, the results from Study One were used to inform the paradigms used empirically in Studies Two and Four. This approach stands in contrast to previous research which had previously adopted a deficit model to lay understandings of emotions and which has privileged academic voices over others (see 8.1.1). The present research is the only program available, to my knowledge, in affective science which has adopted an approach that incorporates lay voices into theory clarification and study refinement. The present results indicate that lay individuals have nuanced insights into emotion phenomena that can be used to refine theory and allow experimental paradigms to be designed to reflect everyday life, thus promoting higher levels of research external validity (see Loyka et al., 2020, for overview). External validity refers to the extent to which the empirical paradigm reflects and preserves the real-world behaviour or process under investigation (Coolican & Flanagan, 2005), for example, whether the paradigm reflects understandings available in everyday life (e.g., emotion population approaches), or whether they have been selected based on extant but flawed research programmes (e.g., distinct emotion categories; see 1.2 for discussion). Increased external validity has been suggested to increase the generalisability of effects and ensure robust scientific practices (Loyka, et al., 2020) and, I argue, provides the opportunity to challenge and refine theory. In the present thesis, the findings appear to provide evidence refuting Ekman's (1990) Basic Emotion Theory framework and instead offer support for populations perspectives of emotion, such as the TCE (Barrett, 2017b). Thus, the work taken as a whole makes a substantial contribution by documenting how the inclusion of lay voices strengthens and improves emotion research.

Before moving on to synthesising the results of Studies Two and Four, I note that the quantitative results of the present thesis do not match those observed in earlier studies, where both venting and swearing were evidenced to increase psychological distress (e.g., (Kaholokula et al., 2017) or up-regulate social pain (e.g., van Heesch & van Beest, 2014). Previous studies of either behaviour were unsatisfactory because the measurement practices used were inappropriate and not supported by emotion theory (see Chapters Five and Seven). For example, Brown and colleagues (2005) argued that venting increased negative state emotion, but did not ask participants to actively engage in venting behaviours. Instead, they asked participants to recall an event that elicited a negative emotion and then to report how often they use venting. The relationship between these two variables was assumed to be causal. These claims appear to be over-ambitious and demonstrate a failure to adequately operationalise constructs within emotion research; a failure which the current research programme has been designed to minimise. This is of particular note as there are few, if any, available empirical investigations into venting or swearing in the context of ER which have been argued to meet the threshold of satisfactory scientific practice (see Chapters Five and Seven for discussion). As such, there is little empirical work with which the present thesis can be adequately compared and contrasted. The two experimental studies in the present thesis are the first available in the literature to measure the impact of venting and swearing on state emotion using robust, multimodal, and temporally sensitive emotion measurement practices. Robust measurement practices have been argued to strengthen the validity of a study and ensure quality of inferences (Flake & Fried, 2020). Hence, the picture which emerges from the analysis above is one of robust scientific practices, which establishes a link between venting/swearing and ER. There is abundant room for further progress in replicating or expanding upon the above findings, but the evidence from Study One that these behaviours are nuanced and provide adaptive emotional outcomes provides a generative platform from which further research can be conducted (see 8.5 below for further discussion).

I will now consider how both venting and swearing relate to one another as emotion regulatory strategies. Within Study One, participants described venting and swearing as fulfilling similar functions, specifically, to provide expedited relief from intense emotions (see 3.3.3). The accelerated regulation associated with both behaviours may underlie why both behaviours are ubiquitously described as providing adaptive regulation in Study One despite the prevalent hypotheses in the literature that venting and swearing are maladaptive regulatory techniques. I suggest that, from the qualitative results, these two behaviours are functionally equivalent mechanisms as they induce expedited ER, but that the expression is moderated by the associated social effects related to either venting or swearing. That is not to say that these two behaviours are mutually exclusive, but that the contextual affordances must be appropriate for venting and swearing to occur in the same instance.

According to social-functional perspectives (Van Kleef, 2017), emotion experiences modulate behavioural responses within the given social environment and coordinate interaction between individuals (Parkinson, 1996). Venting was defined in the present work as a form of expressive speech used during high-intensity emotionality (see 5.1). As discussed above, the literature suggested that venting is a social behaviour; the implementation and efficacy of which is potentially mediated by the availability of an appropriate venting partner (Burchard, 2001; Nils & Rimé, 2012). In the results from Study One, participants described venting in response to both positively and negatively valenced affective states to regulate the emotion. Moreover, venting was described by some participants as being used to solicit social ER for other people. That is, through venting cognitive regulation strategies can be modelled by the interaction partner and then enacted by the individual. I, therefore, suggest that venting requires specific social affordances to be met for the behaviour to effectively regulate emotion. It is noted that swearing may be used during instances of venting, as seen in the exemplar in 3.3.3.4. In this instance, swearword use is described as being modelled by the participant with the colleague ("So I was like: '[swearing] is how I deal with this, you can deal with this the same way I do") when the colleague had previously noted the negative social association for swearword use ("And then he was like; 'oh sorry, I'm swearing.'"). Thus, it is reasonable to suggest that for venting to be efficacious, it requires social interaction with ER modelled by the partner.

Swearing was defined in the present thesis as the use of socially taboo language which conveys connotative information (see 7.1). Swearing is associated with potential negative social outcomes, including aggression (Berger, 1973), and use is constrained along the lines of social normativity and expectations of behaviour. In the published literature, swearword production fulfils various functions such as humour or verbal emphasis (Stapleton, 2003). Using swearing functionally in these ways is posited to only occur within social settings where the risk of socially negative outcomes, such as ostracism from the group, is low. The scope of the present research focused primarily on the association between a given spoken language behaviour and emotion, which will have undoubtedly reduced the opportunity to fully understand the functions swearing satisfies. However, swearing was described as achieving various goals, including acknowledging and validating the other person (e.g. "What a bitch! Oh my God! That's terrible! You are totally in the right!", see 3.3.3.2). It is likely that swearing would not be used in similar acknowledging or validating contexts when swearing is deemed socially taboo. While this exemplar includes a social dimension, swearword use was generally described by participants as occurring without social input, such as when an anxiety eliciting sports event was occurring. Therefore it may be suggested that swearing for ER is largely used in situations where there is a low risk of negative outcomes or where the individual is alone.

It is important to emphasise that, while there is evidence from Study One that these two behaviours can be used in conjunction with one another, I do not suggest that venting and swearing are the same behaviours enacted in different social settings. Instead, I theorise here that venting and swearing may be mechanistically similar to other speech-based emotion regulatory behaviours which are used during bouts of extremely intense state emotion, for instance shouting as described by a participant in section 3.3.3.4. The social context and affordances (e.g. availability of a close venting partner or appraisal of a lack of negative social outcome after swearing) – in conjunction with the underlying regulatory goals of the individual – dictates which behaviour is used. Thus, it is not that either behaviour is a subset of the other, but rather they are used functionally to fulfil similar interpersonal goals, in line with stipulations of PMER (Gross, 2015).

Within both Studies Two and Four, venting and swearing were hypothesised to be able to regulate aspects of an emotion after emotion elicitation. That is, both behaviours regulated emotions as response focused mechanisms (see 1.3 for discussion). As discussed in 1.4, response modulation is the least studied form of ER, despite being the most prolific – occurring following 53% of all emotional events in everyday life (Gross, et al., 2006). Thus, Studies Two and Four provide a valuable contribution to the literature by exploring an under-investigated set of regulatory behaviours.

In the empirical results, only swearing was evidenced to regulate emotion. After swearing, rMSSD increased. As discussed previously (see 7.7), increases in rMSSD are associated with feelings of calmness (McCall & Singer, 2012). In Study One, participants described a similar ineffable calmness experienced after swearing. I suggest here that such changes in interoception which are available for conscious perception – not necessarily constructed or categorised as an emotion *per se* – may document shifts in allostatic resource management and experienced through the abstracted mechanism of valence (see 1.2.2). This suggestion would be consistent with the TCE (Barrett, 2017b). The TCE provides a model of how the body estimates and regulates emotion via allostasis (see 1.2.2 for discussion). The TCE proposes that the brain creates an internal model of the body in the world by using concepts (e.g., prior experiences) and internal signals (e.g., core affect) as predictions to regulate autonomic, immune, and neuroendocrine systems to predict and manage the metabolic demands of future physiological responding and situated action (Barrett, 2006). Changes to the predicted model may be experienced outside of one's awareness as changes to visceral arousal (e.g., changes in HRV) or as identifiable changes in core affect (e.g. pleasant mood; Barrett, 2017b). Any changes to the signals which inform the predictive model are used to update the model continuously to maintain adaptive functioning. By undertaking emotion regulatory behaviours (e.g., swearing) in response to an emotion eliciting stimulus (e.g., social ostracism), I hypothesise that the brain constructs a top-down signal which modulates concepts and internal signals, thereby moving the bodily state in the direction of the desired set point (i.e. regulatory goal or motivation); a set point which may be affective equilibrium after swearing. Hence, the model constructed by the brain predicts that outcome *X* is likely after behaviour *Y*, and thus changes allostatic functioning to meet these needs adaptively in line with the available regulatory goal orientation. Such changes are suggested to be experienced crudely as valence. Models of ER and cognitive energetics are subsequently updated based on the efficacy and resource cost of strategy (i.e. swearing) implementation, thereby creating a loop between current and future emotion elicitation and strategy implementation. This loop would subsequently explain the descriptions in Study One of pervasive swearing use as a method of modulating emotion. Thus, the mechanism through which swearing may yield regulatory outcomes is arguably parsimonious with wider theoretical frameworks.

Furthermore, in Chapter Seven, I argued that the cognitive cost of swearing is low, thus rendering it accessible at any given moment. When considering the social nature of swearing – that it requires appraisals of low-to-no negative social outcomes following use – I posit here that this underlies the evidenced effect in Study Four. That is, the social and contextual affordances were met which thus allowed swearing to fulfil the associated regulatory outcomes. I suggest that, conversely, the affordances required for venting to be efficacious were not met. A social dimension was not implemented in the venting paradigm to increase internal validity; by doing so, the external validity of the study may have been decreased. Consequently, I argue here above that swearing is an emotion regulatory strategy and that – if assessed experimentally with appropriate consideration of social dynamics – venting may also be an emotion regulatory technique. However, as the social affordances were not met in the present work, I suggest here that this limitation may be the root of the lack of effect in Study Two.

At this juncture, it would be remiss not to suggest that the results may be the result of non-meaningful noise in the data. That is, the null effects found in Study Two may instead document a true lack of effect on emotion. Without substantiation through replication efforts, I do not find this suggestion compelling as it would not be parsimonious with the results of Study One or the wider literature, both venting/swearing specific and theoretical. However, this suggestion can also not be dismissed out of hand based on the limited evidence contained within the present work. It is important to bear in mind that without further substantiation the results and inferences above must be treated with caution.

The results of the quantitative studies offer a substantial contribution to the literature because they provide evidence that spoken language behaviours may fulfil adaptive emotion regulatory functions in response to social ostracism. While swearing is only evidenced to impact the trajectory of the psychophysiological component of an emotion, according to the TCE (Barrett, 2017b), the manipulation of any of the three components of an emotion (i.e. behavioural, physiological, subjective experiential) is classified as ER. Together with existing literature on the effects of swearing (see Chapters Seven for overview), these results support the suggestion that swearing can flexibly change state emotion. This is one of the major contributions made by the present research project, as it is the first to provide evidence using theoretically informed measures of emotion that either behaviour provides adaptive emotional outcomes consistent with theories of emotion (e.g., Barrett, 2017b) and ER (e.g., Gross, 2015).

8.3 Alternative Explanations

There are alternative explanations that may account for the present findings if approached from the lens of Basic Emotion Theory (BET; e.g., Ekman, 1999; see 1.2.1 for discussion). BET holds that there are a set of six discrete emotions which are pan-cultural, biologically hardwired, and independent of one another (Keltner, Tracy, et al., 2019). As such, BET has clear stipulations about what is constituted as an emotion and what should be expected as the outcomes from emotion elicitation.

BET (Ekman, 1992) does not recognise social pain as an emotion. Rather it is understood as a contextualised, multidimensional and unpleasant subjective experience that results from interactions between peripheral and central nervous systems with external factors (Gilam et al., 2020). Thus, the available effects which occur within the context of social pain elicitation may be interpreted as evidence of self-regulation or pain management. Any changes to the pain experience are often described as pain *management* or *self-regulation*. It is of note that BET holds that emotional experiences are outcomes of interactions between somato-visceral patterns mediated functionally by the peripheral nervous system, cognitive processes (e.g. attention), meta-cognitive attributes (e.g. appraisals), and central nervous system activation (see 1.2 for overview). Therefore, I believe there exists a significant overlap between the concept of emotion and pain – both conceptually and functionally – suggesting that these phenomena are interrelated and may be managed or regulated by the same mechanisms. There is evidence for this deduction when considering the social-physical pain overlap (see 2.5.3 for discussion), where strategies that reduce self-reported levels of physical pain (e.g., paracetamol; DeWall et al., 2010) also reduce self-reported levels of social pain. While there is limited evidence for the effect of venting on physical pain, consistent empirical reports indicate that repeating a swearword fulfils pain management functions for both physical and social pain (e.g. Robertson & Stephens, 2019; Robertson et al., 2017; Philip & Lombardo, 2017; see 7.2.1). Hence, according to BET, it may be concluded that swearing fulfils pain management, rather than emotion regulatory, functions.

Despite pain not being recognised as an emotion *per se*, both social and physical pain are widely understood to have an affective (i.e. feeling) component (e.g. Eisenberger, et al., 2014). Pain management requires the regulation of various aspects of the pain experience, such as the affective component. While ER is the terminology used in the present thesis, alternative terms such as 'pain management' or 'self-regulation' could have been used interchangeably to meet the requirements of differing epistemological or theoretical positions. I recognise that it could be argued that the evidenced effects contained within each empirical study could be interpreted as an aspect of one of the aforementioned phenomena. Despite this, I do not believe this detracts or refutes the findings or inferences contained within this thesis because of the jingle-jangle fallacy (Kelley, 1927), where similar names explain different constructs (jingle fallacy) and dissimilar labels explain similar constructs (jangle fallacy). I would argue that labels such as 'self-regulation' and 'emotion regulation' may thus explain similar underlying mechanisms related to changing internal states to meet individual goals and contextual needs. Furthermore, the psychological mechanisms which underlie the increased pain tolerance associated with swearword production (see 7.2) are not well understood, as such the present work provides a robust framework from which theoretical interpretations can be made and later substantiated through further empirical research.

It is important to remember that names used to explain phenomena (e.g., self-regulation) allow the researcher to craft a story that aligns with their epistemological, theoretical, or personal world views (Zuberi & Bonilla-Silva, 2008). Such names do not detract from the results, which within the present thesis specifically provide evidence for changes in self-reported psychological and objective physiological measures. Barrett (2022) argued that, if appropriate, labels and associated inferences should only follow once the results had been described to avoid teleology or biased reporting which does not accurately reflect the statistical evidence. Hence, while the present research project employed the TCE (Barrett, 2017b) and psychological constructivism as the theoretical framework and epistemology respectively (see Chapter Two), I conclude here that – if we assume that the present findings are substantiated through replication – the evidence that swearing provides regulatory functions is robust irrespective of one's epistemological or theoretical stance.

The results if approached from the lens of Affective Neuroscience (AN) will also be briefly discussed here. According to Panksepp and colleagues (1978, 1980, 1998), social pain is expressed by PANIC processes in infant chickens, dogs and guinea pigs. That is, opioid receptor systems were dispersed to a greater extent across the brain in animals who were allowed to socially interact for 30-minutes prior to sacrifice compared to in animals who had been isolated for 30-minutes prior to sacrifice (e.g., Panksepp &

Bishop, 1981). The authors concluded from these results that opioid systems regulate social dynamics and that opioid release is experienced as comforting feelings of social care. As discussed in 4.4.1 and 2.5.4, opioid release has been suggested to potentially underlie social pain regulation, a theory which aligns with AN which would extend this idea and suggest that the rewarding behaviour/action tendency which is induced in periods of social pain (a PANIC reaction) would be opioid release.

This theoretical supposition may be extended to help explain the effects found in Study Four. Swearword repetition has been suggested, but not substantiated, to lead to opioid release (Stephens & Umland, 2011; see 7.2 for discussion). Opioid withdrawal and opioid cravings are also associated with lower levels of specific heart rate variability (HRV) indices (i.e., RMSSD and HF HRV; Baker & Garland, 2019; Levin et al., 2019). From the perspective of AN, it may be suggested that swearword production may be a rewarding PANIC behaviour which induces opioid release and, in turn, impacts HRV. Both increased HRV and opioid release are associated with feelings of comfort which are theorised to co-occur with rewarding PANIC behaviours (Panksepp et al., 2019). As with the discussion of how to explain the findings from the perspective of BET, I still argue that – assuming the results are replicable – the results are robust irrespective of theoretical position, but future work could better assess the underlying mechanism to try to substantiate whether the TCE or AN approach best explains the effect (e.g., through imaging opioid dynamics in human brains as part of the experimental procedure).

8.4 Strengths

A strength of the work presented in this thesis is the use of mixed methods, which allowed for a more nuanced approach to the basic questions being investigated. Although the justifications for using a mixed-methods approach have been outlined in detail in Chapter Two, it seems appropriate to reiterate and reflect on the strengths *after* its employment. The approach has enabled the exploration of emotion and regulation phenomena beyond the *usual* lines of enquiry which are constrained by extant work (see 1.3.1 for discussion). That is, the direction of emotion research opportunities is constrained by prior quantitative findings. Previously, most research focussed on cognitive ER strategies and thus yielded subsequent research programmes which further explore cognitive ER strategies. The present research project has been able to address some of the basic questions relating to ER for strategies that have previously been under-researched but were documented in the qualitative study as occurring with regularity in the everyday lives of participants. Due to the very limited knowledge about speech-based ER, the research questions required both exploration and explanation. Hence, the use of both qualitative and quantitative research methods provided a more nuanced understanding of speech-based ER and enabled flexible, robust methodologies to be used in this research.

The studies comprising this thesis represent distinct empirical contributions, outcomes of the preceding qualitative study informed the design of subsequent quantitative studies. For example, in the qualitative study, by demonstrating the vast within-category variation in physiological and subjective experiential components for any given emotion population, subsequent experimental paradigms used measures of emotion that are sensitive to changes in emotionality across the spectrum of hedonic valence. Likewise, the behaviours investigated (i.e. venting and swearing) were identified through the exploratory qualitative phase and subsequently explored using confirmatory techniques in the quantitative paradigms. When taken together, the studies complement one another and enabled triangulation of data, combining and contrasting different research methods and findings, from different perspectives, to advance understandings of everyday ER using speech-based strategies.

The methods used in the quantitative studies were rigorous (e.g., the multimodal emotion measurement protocol in Studies Two and Four) and attempts were made to reduce bias (e.g., allocation concealment protocol). This rigorous approach was exemplified by the work undertaken in Study Three where the emotion measure of the Dutch Version of the Positive and Negative Affect Schedule - Extended used in Chapter Seven was translated and validated per best practice guidelines (Beaton et al., 2000). The methods for translating and validating the measure were transparently documented in Chapter Six, with the workflow and analyses entirely reproducible. The development and validation of a culturally sensitive measure of emotion in Dutch was a strength of the research programme; it demonstrates the rigour with which the construct of emotion was measured in each study contained within this thesis and makes a substantial contribution to the field of emotion by providing a robust measure of emotion for Dutch participant samples. Few previous studies have made such considerations over measurement paradigms in experimental emotion research.

8.5 Limitations

Beyond the strengths of the present work, as with all research, some limitations need to be addressed. Several of the limitations of the individual studies have been outlined in the respective chapters and will not be focussed upon here. I will instead discuss additional limitations which span multiple studies or the thesis as a whole.

The samples used in all studies contained in this thesis are predominantly White, European, and comprised of undergraduate students. The generalisability of findings from research on these populations is a concern for psychology as a discipline, but the homogenous sample may reduce the generalisability of the findings as the variability in ER strategy use and efficacy tends to be reduced when sampling within demographic groups. For example, older adults are more likely to undertake ER early in the emotion generative process (e.g., situation selection; see 1.3) whereas younger people more often used ER strategies later in the emotion generative process (e.g., response focused ER; Livingstone & Isaacowitz, 2021). As such, the generalisability of the results may be reduced when applied to groups outside of young, White, European populations. Although the current constellation of studies are based on a narrow sample of participants, the results do provide insight into how emotions are regulated in daily life and provide a framework from which explorations into the experiences of people from wider demographic groups (e.g., older adults) can be added.

There are limitations of using the PANAS-X/PANAS-XD as a measure of emotion (see 6.4.2 for discussion). The PANAS-X and PANAS-XD both have low construct validity, meaning that there is limited evidence that the questionnaire appropriately measures its proposed latent constructs. This may impact the results of the present research as this may explain why there were null effects (i.e., the constructs are not measured properly and so the effects were not captured). It is beyond the scope of this thesis to further assess and validate the PANAS-X/PANAS-XD, however it is recommended that future work uses both exploratory and confirmatory factor analysis techniques to better measure emotion experience using the PANAS-X and that future affective scientists devote space to theoretically and conceptually delineate emotion experience (see 6.4.2 for further discussion).

The experimental studies used laboratory-based experiments to investigate emotion qualia in response to social interactions, specifically social ostracism. Although undertaking experiments in laboratory conditions ensures internal validity of the research at hand, the paradigms used within the present thesis oversimplify social interaction and the nuances inherent in each context, relationship, and individual. Thus, they are only a partial substitute for the real world. However, given the complexity and flexibility of real-world social behaviour, it is almost impossible to control potential confounding variables within social interactions. Even when using confederates, every participant experiences variation in the received stimuli, available appraisals, and emotion population elicited, which reduces the ability to interpret data. Similarly, the quantitative paradigms used in the present thesis (i.e. reading a script; repeating a word) were oversimplified and likely lack external validity. To confirm the results in the quantitative studies, venting and swearing paradigms should be directly and conceptually replicated in real-world environments to substantiate the effects available in laboratory conditions, such as through momentary assessments. Nonetheless, the findings from this collection of quantitative experiments triangulate with some of the findings from the qualitative study (see 3.3), which suggests that even in this artificial environment, venting and swearing are likely to regulate emotions adaptively.

Another consideration is the generalisability of findings to other emotion populations or contexts. According to the TCE (Barrett, 2017b), any given effect is not necessarily generalisable across emotion types or eliciting contexts (Barrett and Westlin, 2021). The findings of the present thesis are thus assumed to only generalise to emotions elicited by Cyberball. It is noted that the emotions reportedly elicited by Cyberball varied greatly across participants, for example, feelings of being thoughtful and irritated were identified by different participants as being generated after Cyberball gameplay exclusion. However, it is only tentatively assumed that the findings will generalise to all instances of thoughtfulness or irritation, nor other instances of social ostracism. To assess whether the effects of venting and swearing are generalisable, conceptual replications are required to extend the findings of the present body of work. Despite this limitation, the studies presented provide a framework from which such replications can be undertaken and which may serve to support other future research into understudied emotion phenomena.

A related limitation of this work is that the highly-controlled and non-generalisable stimuli used do not sensitively take account of linguistic variation in emotion experience and responding. Emotion research as a discipline does not tend to focus on the social influences of emotion elicitation and regulation, rather it implicitly assumes that the available results are likely to occur universally. As with the lack of assumed generalisability across emotion types, the TCE (Barrett, 2017b) similarly does not assume generalisation of any given effect cross-culturally/linguistically (Barrett, 2022). As social and cultural cues may govern fundamental aspects of ER, future research should identify the cultural and social contexts within which the research is conducted and avoid assuming the universality of any evidenced effects without support from cross-cultural samples. Concerning the present study, the results may only be representative of non-clinical adult populations from the United Kingdom and the Netherlands and cannot be generalised further. Regardless, these results provide insight into the impact of venting and swearing on state emotion, and yield a theoretical approach that can be applied across languages and cultures when exploring whether the effects found in the present thesis hold universally.

Furthermore, as discussed in 5.9.3 and 7.7.3, the paradigms used in Studies Two and Four may have traded high levels of laboratory control for low levels of external validity (i.e. low ecological validity). Both studies followed highly stylised task paradigms (i.e., script reading, word repetition) which may not fully represent the use of these behaviours in everyday life. It may, therefore, be argued that the paradigms may not have reproduced elements of the complex natural situations that occur in everyday life, the results may not determine associated true cause-and-effect relations, and thus may not reflect true or null effects present in actual instances of either behaviour. If we assume such concerns ring true, using the present results, however, there is abundant room for further research with novel paradigms and operationalisation, using the present work as a springboard for further investigations that increase ecological validity.

For example, with venting – as the social dimensions of interaction may contain both meaningful and non-meaningful noise that confounds both paradigm design and results – further exploration into linguistic signatures which promote emotion regulation efficacy may be yield a fruitful area of research. Within speech-based emotion regulation (see 1.3.3), people use words to identify and communicate information about their subjective experiences, such as through affect labelling or self-talk. While this is a growing area of research in the effects of textual communication on emotion qualia (e.g. Nook, 2021; Nook et al., 2021, 2022; Nook, Schleider, et al., 2017), there is little research on verbal communication. Future research into the linguistic signatures available within naturalistic speech following emotion induction may yield fruitful insights into how and whether speech-based emotion regulation is efficacious.

With swearing, research to date has used a standardised metronomic repetition of a swearword across the span of several minutes, which may reflect limited examples of swearword use in everyday life. Further swearing studies may wish to compare the effects of a single utterance compared to repeated utterances on outcome variables or, conversely, compare the effects of swearing repetition to the use of a context congruent word (e.g., 'ow' in acute pain induction). Thus, there are different ways of exploring the effects of venting and swearing on emotional outcomes which may complement and extend the present findings.

8.6 Implications and Future Directions

The studies contained in this thesis provided some evidence to support the hypothesis that swearing can be used as a form of effective and adaptive ER in response to social ostracising events. The underlying mechanism for such regulation requires elucidation – for example, it would be informative to know whether a single utterance yields the same effect or whether other physiological emotion response systems are similarly influenced by swearword repetition. Extrapolating from the TCE (Barrett, 2017b) and PMER (Gross, 2015) I have discussed potential inferences and underlying models above, however, these inferences must be substantiated with further enquiry. Despite this caveat, the present work has several important implications and opens new directions for theoretical/research (8.6.1) and applied (8.6.2) settings. I will discuss these settings in turn.

8.6.1 Implications for Theory and Research

The research presented in this thesis is novel in empirically applying lay understandings of emotion to advance the understandings of and empirical investigations into emotion phenomena. As discussed above, previous research has tended to adopt a deficit model which assumes that lay individuals lack the insight or capacity to understand complex emotion phenomena. This approach is surprising as, in many other domains of psychological science, public involvement or the inclusion of non-academic perspectives is highly valued and prioritised (Greenhalgh et al., 2019). Indeed, by incorporating real-world and lived-experience perspectives, the efficiency and value of research is suggested to be improved (Edelman & Barron, 2016). The efficiency of research is a key concern for affective science because, as described in 1.2, the previous hegemonic theory of BET (Ekman, 1992) has yielded degenerating research programmes (see 2.2) into emotion that do not necessarily replicate nor reflect real-world phenomena. This is particularly evident when considering the canonised six basic emotions were selected based on researcher appraisals about ease of operationalisability and not necessarily on their universality (Ellsworth, 2014); a method which privileged the academic thought process over non-specialist ideas and perceptions and has led to a cascade of research which does not adequately reflect actual psychological phenomena.

The present research stands in opposition to this methodology by blending and synthesising lay individuals' thoughts and perceptions within the knowledge creation process. The work has evidenced that members of the general public have complex and nuanced understandings of emotion concepts cohere with theoretical suppositions from populations perspectives and models of ER, such as the variation within and across emotion instances and understandings of the affordances required for a given regulation strategy to be efficacious (see 3.3). By including these insights into the research and knowledge creation process, the current work documents the powerful insight non-specialists have into emotion and regulation. The insights allow for theory refinement, as well as increasing the value of the results outside of academic circles.

This is a novel approach in the literature and may act as the catalyst for members of the affective scientific community to consider involving participants in theory refinement and research design in the future. Future work of this nature could create a corpus of data exploring how lay individuals perceive emotion and regulation phenomena across cultures and languages and then use the data to design large scale international collaborative efforts to assess whether these insights reflect actual effects.

The findings also further demonstrate that the research assessing common regulation strategies is underdeveloped without a clear reason. Despite calls for action for researchers to expand the literature by evaluating less commonly investigated regulation strategies (e.g. Levenson, 2019; Koole, 2020), such as spoken language, there remains a dearth of exploration beyond the usual lines of research (e.g. reappraisal; see 1.3). The present work identified and tested the efficacy of two commonly used speech-based ER strategies as identified by participants in the qualitative enquiry. The results from all the studies make plain that the dearth of research is not based on real-world effects or available behaviours. Future research should focus on adopting the present sequential, mixed methodological approach and in prioritise investigations that reflect the everyday lives of non-clinical populations. The present approach does not need to solely apply to speech-based regulatory strategies (e.g., affect labelling, self-talk) but can be applied to a myriad of other response focussed strategies, such as humour use.

Furthermore, the work contained in this thesis is the first to test whether venting or swearing behaviours fulfil emotion regulatory functions using theoretically informed and multimodal measurement practices. To this end, the thesis lends support to Nils & Rimé's (2012) deductions that speech regulates emotions and, specifically, that it does so in a multifaceted manner. Previously this phenomenon has only been investigated by using self-reports of negative affect, this work thus provides a framework for using a complex measurement process to measure emotions regulated by spoken language behaviours and, presumably, other response focused mechanisms. Future research should aim to corroborate the findings contained within this work and also expand methodological horizons by including sensitive measurement practices to best assess regulatory phenomena.

It is also noted here that a large corpus of data was collected for the qualitative study which explored many aspects of speech-based ER which may be subject to further research. For example, I proposed a model of how ER can be applied to speech (see 3.3.3.1). While this model coheres with other suggestions in the literature – such as Pennebaker and Chung's (2007) suggestion that when emotions are translated into words, they can be reappraised – further research could assess whether the findings and analysis from the qualitative study reflect actual ER processes.

When considering how to take this research forwards there are two primary pathways beyond direct replication attempts: (1) emotion regulation research (see 5.9 and 7.7 for discussion) and (2) measurement research (see 6.4.2 for discussion). Firstly, the research could be progressed by experimental work assessing whether venting or swearing effectively regulates emotions in different conditions. By expanding the research in this way, a better understanding of how these behaviours influence affect can be gained. This is important given the popularity of both venting and swearing behaviours (see Study One). Given the low ecological validity of both the venting and swearing paradigms, it is important to consider how future work may explore different ways of operationalising these paradigms. There are a few potential opportunities to do this.

If the researcher was interesting in exploring the effect of venting on social pain (as in the present thesis), they may wish to change how venting is manipulated. In the present work, participants were provided with a standardised script which contained venting phrases (see 5.7.4). Future work may wish to allow participants to write their own script or to engage in free-form (i.e., unscripted) venting. An example of this can be found in my recent work (Clarke et al., 2022) where I assessed whether free-form venting – where participants were asked to recall a negative emotional event which resulted in social pain (e.g., relationship breakdown) and leave a video message to a friend about this – regulated emotions effectively compared to simply describing the event.

If the researcher was instead interested in whether venting influenced the trajectories of other emotions (e.g., fear, sadness, anger), the same methodology used in the present thesis could be used but the emotion elicitation paradigm should be changed to better induce the target emotion. For example, participants could be instructed to engage in an autobiographical recall task for a target emotion population and then, using a script, vent the associated emotion.

If the researcher was otherwise interested in whether and how swearing may regulate emotions, the researcher could assess whether allowing participants to choose the repeated word – as in the present thesis – is as effective as using the same word across all participants (i.e., whether increased internal validity of the study influences outcomes). Alternatively, participants could be instructed to only swear once or to *swear with feeling*, with results compared to the standardised approach used in the present thesis where participants repeated a swearword over the course of 2-minutes.

Secondly, given the evidence that the PANAS-X may be a poor measure of emotion experience and is a recommended measure in the literature (see 4.4.3.2), there is the opportunity for a research programme to be designed and conducted to assess and improve emotion measurement. This potential approach and the associated recommendations for future research are discussed at length in sections 8.5 and 6.4.2. However, *in precis,* researchers may wish to conduct a series of exploratory and confirmatory factor analyses to best model PANAS-X emotion measurement.

8.6.2 Implications for Applied Settings

The results have implications for effective everyday ER interventions and for understanding how emotions are communicated and regulated effectively. This is particularly salient in the context of the COVID-19 pandemic where social interaction and mental health provision have been unpredictably disrupted by related changes to government policy. This is noteworthy in that many support services have been reduced while demand has increased. Unsurprisingly, there has been a rise in emotional distress in the UK since the onset of the pandemic (Khan et al., 2022). It is therefore vital to investigate and understand cost-effective strategies which can be implemented within the everyday lives of people who do not meet the threshold of clinically significant emotional distress. It is the recommendation of this thesis that future work aims to understand the processes underlying everyday behaviours which could fulfil regulatory functions, especially where these behaviours are associated with normative beliefs about maladaptation or negative outcomes, despite their prevalent use. The results of the present work may serve as an invitation to reappraise previous assumptions relating to swearing and venting, and to consider the functions which may be achieved through enacting these behaviours. By creating a more nuanced and theoretically informed model underlying these behaviours, recommendations may be made which can support the mental health of non-clinical populations. However, future work must substantiate the present results before any firm recommendations being made. With that caveat in mind, I will now make two suggestions for applications of the present work into applied settings.

When considering more concrete applications, there are two potential areas in which the present findings could be employed in applied settings: (1) emotion education programs; and (2) assessing the efficacy of behavioural strategies to reduce distress. Firstly, the qualitative study found that participants had a sophisticated understanding of emotion and processes underlying emotion phenomena. The description of emotion conceptual space described by participants closely resembled the affective circumplex (see 1.2.1.3). Specifically, participants described a circular space best understood by intersecting axes of intensity and valence (see 3.3.1). Such complex understandings of emotion may be capitalised on during therapeutic work focusing on emotion education, including formulations aimed at improving emotion granularity. One such program, the RULER approach (Brackett et al., 2019), aims to educate children about emotion population groupings by plotting subjective emotional experience using the affective circumplex and by noting key features of the experience (e.g., valence, intensity). Once plotted, the emotion experience can be labelled, learnt, understood, and regulated, thus leading to better psychological outcomes for the child. The present findings from the qualitative study suggest that such an approach may be similarly beneficial to adult populations, as emotions were understood and conceptually organised like the RULER approach and the affective circumplex.

Secondly, the results from the quantitative studies invites clinicians to also include physiological outcomes into their practice when assessing the efficacy of behavioural interventions. Study Four found that heart rate variability increased after swearword repetition when compared to neutral word repetition, which suggests parasympathetic nervous system dominance. As previously discussed (see 1.3), adaptive ER may encompass the regulation of physiological response systems (Gross, 2015). However few interventions exist that focus on the regulation of physiological concomitants for clinical populations (Dennis et al., 2012). Where strategies that aim to cope with immediate physiological emotion response systems (e.g., focussed breathing; Rosen et al., 2019), ER difficulties and distress have been found to reduce. The present findings suggest that the regulation of physiology may occur for more everyday ER techniques and is, therefore, an important variable to consider when implementing and assessing behavioural techniques for reducing emotional distress.

It is noted here that the present work focussed solely on speech-based ER. I decided to focus on this area due to the dearth of research on the topic despite the prevalence of speech use after emotional events (e.g., Rimé et al., 1991b). The present results may, however, be more widely applied to non-speech-based domains which are similarly associated with the free expression of high-intensity emotion, such as physical venting (e.g. hitting a punching bag; Burchard, 2001). Further research could take the present paradigm and findings to inform an experimental exploration into these forms of ER to assess whether that are similarities in outcomes to those found in the present work.

8.7 Conclusion

This thesis has focused on the efficacy of speech-based ER strategies in response to social ostracism. More specifically, regardless of the limitations discussed in this chapter, this work has contributed towards advancing models of everyday ER from a constructivist perspective – the Theory of Constructed Emotion (TCE; Barrett, 2017b). The qualitative study provided the foundation from which further studies were designed, as the collected data allowed for the inclusion of lay individual perspectives of which behaviours could be investigated. According to the TCE, emotions are regulated when any of the three components of an emotion – physiological, subjective experiential, and behavioural – are modulated. The quantitative studies found that swearing impacted heart rate variability, a measure of physiological ER. It was suggested that this change documented parasympathetic nervous system dominance (rest-and-relaxation response) following swearword repetition. These results are in line with stipulations from the PMER (Gross, 2015). Based on these findings, it may be time to shift research programmes towards lesser investigated but widely used (potential) regulation strategies, such as venting and swearing, to better understand actual everyday ER. The present work provides researchers with a proven methodology from which future research can incorporate lay perspectives into theory refinement and paradigm design to better capture and examine regulatory phenomena. Additionally, the findings provide a clear framework from which the affective science community can revolutionise how we view 'adaptive' or 'maladaptive' regulatory strategies, and how these strategies are investigated.

References

Abramson, L., Petranker, R., Marom, I., & Aviezer, H. (2021). Social interaction context shapes emotion recognition through body language, not facial expressions. *Emotion*, *21*(3), 557–568. https://doi.org/10.1037/emo0000718

Adolphs, R., Mlodinow, L., & Barrett, L. F. (2019). What is an emotion? *Current Biology*, *29*(20), R1055–R1069.

Aickin, M., & Gensler, H. (1996). Adjusting for multiple testing when reporting research results: the Bonferroni vs Holm methods. *American Journal of Public Health*, *86*(5), 726–728. https://doi.org/10.2105/AJPH.86.5.726

Akselrod, S., Gordon, D., Ubel, F. A., Shannon, D. C., Berger, A. C., & Cohen, R. J. (1981). Power Spectrum Analysis of Heart Rate Fluctuation: A Quantitative Probe of Beat-to-Beat Cardiovascular Control. *Science*, *213*(4504), 220–222. https://doi.org/10.1126/science.6166045

Aldao, A. (2013). The Future of Emotion Regulation Research. *Perspectives on Psychological Science*, *8*(2), 155–172. https://doi.org/10.1177/1745691612459518

Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion-regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review*, *30*(2), 217–237. https://doi.org/10.1016/j.cpr.2009.11.004

Alghowinem, S., Goecke, R., Wagner, M., & Alwabil, A. (2019). Evaluating and Validating Emotion Elicitation Using English and Arabic Movie Clips on a Saudi Sample. *Sensors*, *19*(10), 2218. https://doi.org/10.3390/s19102218

Allison Cato Jackson, M., & Crosson, B. (2006). *Emotional connotation of words: role of emotion in distributed semantic systems* (pp. 205–216). https://doi.org/10.1016/S0079-6123(06)56010-8

Alonso-Arbiol, I., & van de Vijver, F. J. R. (2010). A Historical Analysis of the European Journal of Psychological Assessment. *European Journal of Psychological Assessment*, *26*(4), 238–247. https://doi.org/10.1027/1015-5759/a000032

Andrade, C. (2020). Sample Size and its Importance in Research. *Indian Journal of Psychological Medicine*, *42*(1), 102–103. https://doi.org/10.4103/IJPSYM.IJPSYM_504_19

Appelhans, B. M., & Luecken, L. J. (2006). Heart Rate Variability as an Index of Regulated Emotional Responding. *Review of General Psychology*, *10*(3), 229–240. https://doi.org/10.1037/1089-2680.10.3.229

Armstrong, R. A. (2014). When to use the Bonferroni correction. *Ophthalmic and Physiological Optics*, *34*(5), 502–508. https://doi.org/10.1111/opo.12131

Arnett, J. J. (2007). Emerging Adulthood: What Is It, and What Is It Good For? *Child Development Perspectives*, *1*(2), 68–73. https://doi.org/10.1111/j.1750-8606.2007.00016.x

A. Van Kleef, G. (2017). The Social Effects of Emotions are Functionally Equivalent Across Expressive Modalities. *Psychological Inquiry*, *28*(2–3), 211–216. https://doi.org/10.1080/1047840X.2017.1338102

Aviezer, H., Hassin, R. R., Bentin, S., & Trope, Y. (2008). Putting facial expressions back in context. In *First impressions.* (pp. 255–286). Guilford Publications. https://doi.org/10.1037/10559-014

Aysin, B., & Aysin, E. (2006). Effect of Respiration in Heart Rate Variability (HRV) Analysis. *2006 International Conference of the IEEE Engineering in Medicine and Biology Society*, 1776–1779. https://doi.org/10.1109/IEMBS.2006.260773

Azari, B., Westlin, C., Satpute, A. B., Hutchinson, J. B., Kragel, P. A., Hoemann, K., Khan, Z., Wormwood, J. B., Quigley, K. S., Erdogmus, D., Dy, J., Brooks, D. H., & Barrett, L. F. (2020). Comparing supervised and unsupervised approaches to emotion categorization in the human brain, body, and subjective experience. *Scientific Reports*, *10*(1), 20284. https://doi.org/10.1038/s41598-020-77117-8

Bagby, R. M., Parker, J. D. A., & Taylor, G. J. (1994). The twenty-item Toronto Alexithymia scale—I. Item selection and cross-validation of the factor structure. *Journal of Psychosomatic Research*, *38*(1), 23–32. https://doi.org/10.1016/0022-3999(94)90005-1

Bagby, R. M., Taylor, G. J., & Parker, J. D. A. (1994). The twenty-item Toronto Alexithymia scale—II. Convergent, discriminant, and concurrent validity. *Journal of Psychosomatic Research*, *38*(1), 33–40. https://doi.org/10.1016/0022-3999(94)90006-X

Bagozzi, R. P. (1993). An examination of the psychometric properties of measures of negative affect in the PANAS-X scales. *Journal of Personality and Social Psychology*, *65*(4), 836–851. https://doi.org/10.1037/0022-3514.65.4.836

Baker, A. K., & Garland, E. L. (2019). Autonomic and affective mediators of the relationship between mindfulness and opioid craving among chronic pain patients. *Experimental and Clinical Psychopharmacology*, *27*(1), 55–63. https://doi.org/10.1037/pha0000225

Bąk, H. (2016). Emotional Relativity—Argument from Nurture. In *Emotional Prosody Processing for Non-Native English Speakers* (pp. 1–25). Springer International Publishing. https://doi.org/10.1007/978-3-319-44042-2_1

Baltazar, M., Västfjäll, D., Asutay, E., Koppel, L., & Saarikallio, S. (2019). Is it me or the music? Stress reduction and the role of regulation strategies and music. *Music & Science*, *2*, 2059204319844161. https://doi.org/10.1177/2059204319844161

Bandalos, D. L., Finney, S. J., Hancock, G. R., & Mueller, R. O. (2010). *The reviewer's guide to quantitative methods in the social sciences*. Routledge New York, NY, USA:

Banks, M. A. (2005). Towards a Continuum of Scholarship: The Eventual Collapse of the Distinction between Grey and Non-Grey Literature. *7th Grey Literature (GL7) Conference: Open Access to Grey Resources*.

Barak, A., Boniel-Nissim, M., & Suler, J. (2008). Fostering empowerment in online support groups. *Computers in Human Behavior*, *24*(5), 1867–1883. https://doi.org/10.1016/j.chb.2008.02.004

Bar-Kalifa, E., Prinz, J. N., Atzil-Slonim, D., Rubel, J. A., Lutz, W., & Rafaeli, E. (2019). Physiological synchrony and therapeutic alliance in an imagery-based treatment. *Journal of Counseling Psychology*, *66*(4), 508–517. https://doi.org/10.1037/cou0000358

Barnes, S. J., & Vidgen, R. T. (2006). Data triangulation and web quality metrics: A case study in e-government. *Information & Management*, *43*(6), 767–777. https://doi.org/10.1016/j.im.2006.06.001

Barrett, L. F. (2006). Valence is a basic building block of emotional life. *Journal of Research in Personality*, *40*(1), 35–55. https://doi.org/10.1016/j.jrp.2005.08.006

Barrett, L. F. (2017a). How emotions are made: The secret life of the brain. In *How emotions are made: The secret life of the brain.* Houghton Mifflin Harcourt.

Barrett, L. F. (2017b). The theory of constructed emotion: an active inference account of interoception and categorization. *Social Cognitive and Affective Neuroscience*, *12*(1), 1–23. https://doi.org/10.1093/scan/nsw154

Barrett, L. F. (2022). Context reconsidered: Complex signal ensembles, relational meaning, and population thinking in psychological science. *American Psychologist*, *77*(8), 894–920. https://doi.org/10.1037/amp0001054

Barrett, L. F., & Adolphs, R. (2021, April 15). Moving Past Theoretical Deadlocks in Affective Science. *The Society for Affective Science Annual Conference*.

Barrett, L. F., Adolphs, R., Marsella, S., Martinez, A. M., & Pollak, S. D. (2019). Emotional Expressions Reconsidered: Challenges to Inferring Emotion From Human Facial Movements. *Psychological Science in the Public Interest*, *20*(1), 1–68. https://doi.org/10.1177/1529100619832930

Barrett, L. F., & Bliss-Moreau, E. (2009). *Chapter 4 Affect as a Psychological Primitive* (pp. 167–218). https://doi.org/10.1016/S0065-2601(08)00404-8

Barrett, L. F., Gross, J., Christensen, T. C., & Benvenuto, M. (2001). Knowing what you're feeling and knowing what to do about it: Mapping the relation between emotion differentiation and emotion regulation. *Cognition & Emotion*, *15*(6), 713–724. https://doi.org/10.1080/02699930143000239

Barrett, L. F., Mesquita, B., & Gendron, M. (2011). Context in Emotion Perception. *Current Directions in Psychological Science*, *20*(5), 286–290. https://doi.org/10.1177/0963721411422522

Barrett, L. F., Mesquita, B., Ochsner, K. N., & Gross, J. J. (2007). The Experience of Emotion. *Annual Review of Psychology*, *58*(1), 373–403. https://doi.org/10.1146/annurev.psych.58.110405.085709

Barrett, L. F., Quigley, K. S., & Hamilton, P. (2016). An active inference theory of allostasis and interoception in depression. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *371*(1708), 20160011. https://doi.org/10.1098/rstb.2016.0011

Barrett, L. F., Robin, L., Pietromonaco, P. R., & Eyssell, K. M. (1998). Are Women the "More Emotional" Sex? Evidence From Emotional Experiences in Social Context. *Cognition & Emotion*, *12*(4), 555–578. https://doi.org/10.1080/026999398379565

Barrett, L. F., & Russell, J. A. (1998). Independence and bipolarity in the structure of current affect. *Journal of Personality and Social Psychology*, *74*(4), 967–984. https://doi.org/10.1037/0022-3514.74.4.967

Barrett, L. F., & Russell, J. A. (2015). An introduction to psychological construction. *The Psychological Construction of Emotion*, 1–17.

Barrett, L. F., & Satpute, A. B. (2019). Historical pitfalls and new directions in the neuroscience of emotion. *Neuroscience Letters*, *693*, 9–18. https://doi.org/10.1016/j.neulet.2017.07.045

Barrett, L. F., & Simmons, W. K. (2015). Interoceptive predictions in the brain. *Nature Reviews Neuroscience*, *16*(7), 419–429. https://doi.org/10.1038/nrn3950

Barrett, L. F., & Westlin, C. (2021). Navigating the science of emotion. In *Emotion Measurement* (pp. 39–84). Elsevier. https://doi.org/10.1016/B978-0-12-821124-3.00002-8

Bartlett, P. L., Jordan, M. I., & McAuliffe, J. D. (2006). Convexity, Classification, and Risk Bounds. *Journal of the American Statistical Association*, *101*(473), 138–156. https://doi.org/10.1198/016214505000000907

Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*, *25*(24), 3186–3191.

Beauchaine, T. (2001). Vagal tone, development, and Gray's motivational theory: Toward an integrated model of autonomic nervous system functioning in psychopathology. *Development and Psychopathology*, *13*(2), 183–214. https://doi.org/10.1017/S0954579401002012

Beauducel, A., & Herzberg, P. Y. (2006). On the Performance of Maximum Likelihood Versus Means and Variance Adjusted Weighted Least Squares Estimation in CFA.

Structural Equation Modeling: A Multidisciplinary Journal, *13*(2), 186–203. https://doi.org/10.1207/s15328007sem1302_2

Beedie, C., Terry, P., & Lane, A. (2005). Distinctions between emotion and mood. *Cognition & Emotion*, *19*(6), 847–878. https://doi.org/10.1080/02699930541000057

Beers Fägersten, K. (2012). *Who's Swearing Now?: The Social Aspects of Conversational Swearing*. Cambridge Scholars Publishing.

Behfar, K. J., Cronin, M. A., & McCarthy, K. (2020). Realizing the Upside of Venting: The Role of the "Challenger Listener". *Academy of Management Discoveries*, *6*(4), 609–630. https://doi.org/10.5465/amd.2018.0066

Ben-Ezra, M., & Hamama-Raz, Y. (2021). Social Workers during COVID-19: Do Coping Strategies Differentially Mediate the Relationship between Job Demand and Psychological Distress? *The British Journal of Social Work*, *51*(5), 1551–1567. https://doi.org/10.1093/bjsw/bcaa210

Berent, I., Feldman Barrett, L., & Platt, M. (2020). Essentialist Biases in Reasoning About Emotions. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.562666

Berger, A. (1973). Swearing and Society. *Institute of General Semantics* , *30*(3), 282–286.

Berger Peter, L., & Luckmann, T. (1966). The social construction of reality. *A Treatise in the Sociology of Knowledge*.

Berger, R. (2015). Now I see it, now I don't: researcher's position and reflexivity in qualitative research. *Qualitative Research*, *15*(2), 219–234. https://doi.org/10.1177/1468794112468475

Bernstein, M. J., & Claypool, H. M. (2012). Social Exclusion and Pain Sensitivity. *Personality and Social Psychology Bulletin*, *38*(2), 185–196. https://doi.org/10.1177/0146167211422449

Berntson, G. G., Quigley, K. S., Norman, G. J., & Lozano, D. L. (2017). Cardiovascular psychophysiology. In J. T. Cacioppo, L. G. Tassinary, & G. G. Berntson (Eds.), *Handbook of psychophysiology* (pp. 183–216). Cambridge University Press.

Beyoncé. (2016). Lemonade [Album]. In *Parkwood & Columbia*.

Bhagat, O. L., Kharya, C., Jaryal, A., & Deepak, K. K. (2017). Acute effects on cardiovascular oscillations during controlled slow yogic breathing. *Indian Journal of Medical Research*, *145*(4), 503–512.

Billman, G. E. (2013). The effect of heart rate on the heart rate variability response to autonomic interventions. *Frontiers in Physiology*, *4*. https://doi.org/10.3389/fphys.2013.00222

Blanchot, M., & Hanson, S. (1987). Everyday Speech. *Yale French Studies*, *73*, 12. https://doi.org/10.2307/2930194

Blancke, S., Boudry, M., & Pigliucci, M. (2017). Why Do Irrational Beliefs Mimic Science? The Cultural Evolution of Pseudoscience. *Theoria*, *83*(1), 78–97. https://doi.org/10.1111/theo.12109

Boiger, M., Ceulemans, E., de Leersnyder, J., Uchida, Y., Norasakkunkit, V., & Mesquita, B. (2018). Beyond essentialism: Cultural differences in emotions revisited. *Emotion*, *18*(8), 1142–1162. https://doi.org/10.1037/emo0000390

Bollen, K. A., & Stine, R. A. (1992). Bootstrapping Goodness-of-Fit Measures in Structural Equation Models. *Sociological Methods & Research*, *21*(2), 205–229. https://doi.org/10.1177/0049124192021002004

Bollen, K., & Lennox, R. (1991). Conventional wisdom on measurement: A structural equation perspective. *Psychological Bulletin*, *110*(2), 305–314. https://doi.org/10.1037/0033-2909.110.2.305

Borenstein, M., Hedges, L. v., Higgins, J. P. T., & Rothstein, H. R. (2009). *Introduction to Meta-Analysis*. Wiley. https://doi.org/10.1002/9780470743386

Borg, G. (1998). Borg's perceived exertion and pain scales. *Human Kinetics*.

Borghi, A. M., & Binkofski, F. (2014). *Words as social tools: An embodied view on abstract concepts* (Vol. 2). Springer.

Box, G. E. P. (1976). Science and Statistics. *Journal of the American Statistical Association*, *71*(356), 791–799. https://doi.org/10.1080/01621459.1976.10480949

Brackett, M. A., Bailey, C. S., Hoffmann, J. D., & Simmons, D. N. (2019). RULER: A Theory-Driven, Systemic Approach to Social, Emotional, and Academic Learning. *Educational Psychologist*, *54*(3), 144–161. https://doi.org/10.1080/00461520.2019.1614447

Bradley, M. M., Cuthbert, B. N., & Lang, P. J. (1999). Affect and the Startle Reflex. In *Startle Modification* (pp. 157–184). Cambridge University Press. https://doi.org/10.1017/CBO9780511665523.010

Bradley, M. M., & Lang, P. J. (2000). Measuring emotion: Behavior, feeling, and physiology. In *Cognitive neuroscience of emotion.* (pp. 242–276). Oxford University Press.

Brans, K., Koval, P., Verduyn, P., Lim, Y. L., & Kuppens, P. (2013). The regulation of negative and positive affect in daily life. *Emotion*, *13*(5), 926–939. https://doi.org/10.1037/a0032400

Braunstein, L. M., Gross, J. J., & Ochsner, K. N. (2017). Explicit and implicit emotion regulation: a multi-level framework. *Social Cognitive and Affective Neuroscience*, *12*(10), 1545–1557. https://doi.org/10.1093/scan/nsx096

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Braun, V., & Clarke, V. (2021). To saturate or not to saturate? Questioning data saturation as a useful concept for thematic analysis and sample-size rationales. *Qualitative Research in Sport, Exercise and Health*, *13*(2), 201–216. https://doi.org/10.1080/2159676X.2019.1704846

Breuer, J., & Freud, S. (1893). On The Psychical Mechanism of Hysterical Phenomena: Preliminary Communication from Studies on Hysteria. In *The Standard Edition of the Complete Psychological Works of Sigmund Freud* (Vol. 2, pp. 1–17).

Broderick, J. E., Schwartz, J. E., Vikingstad, G., Pribbernow, M., Grossman, S., & Stone, A. A. (2008). The accuracy of pain and fatigue items across different reporting periods. *Pain*, *139*(1), 146–157. https://doi.org/10.1016/j.pain.2008.03.024

Brodsky, A. E. (2008). Fieldnotes. In L. M. Given (Ed.), *The SAGE Encyclopedia of Qualitative Research Methods* (pp. 324–344). SAGE Publications, Inc. https://doi.org/10.4135/9781412963909.n172

Browne, M. W., & Cudeck, R. (1993). Alternative Ways of Assessing Model Fit. In K. A. Bollen & J. S. Long (Eds.), *Testing Structural Equation Models* (pp. 136–162). Sage.

Brown, S. P., Westbrook, R. A., & Challagalla, G. (2005). Good Cope, Bad Cope: Adaptive and Maladaptive Coping Strategies Following a Critical Negative Work Event. *Journal of Applied Psychology*, *90*(4), 792–798. https://doi.org/10.1037/0021-9010.90.4.792

Brugha, T. S., Bebbington, P. E., & Jenkins, R. (1999). A difference that matters: comparisons of structured and semi-structured psychiatric diagnostic interviews in the general population. *Psychological Medicine*, *29*(5), 1013–1020. https://doi.org/10.1017/S0033291799008880

Buelow, M. T., Okdie, B. M., Brunell, A. B., & Trost, Z. (2015). Stuck in a moment and you cannot get out of it: The lingering effects of ostracism on cognition and satisfaction of basic needs. *Personality and Individual Differences*, *76*, 39–43. https://doi.org/10.1016/j.paid.2014.11.051

Burchard, B. (2001, February). 'Venting' in the Workplace: An Ethnographic Study among Resident Assistants. *E Annual Meeting of the Western States Communication Association*.

Burklund, L. J., Creswell, J. D., Irwin, M. R., & Lieberman, M. D. (2014). The common and distinct neural bases of affect labeling and reappraisal in healthy adults. *Frontiers in Psychology*, *5*. https://doi.org/10.3389/fpsyg.2014.00221

Burr, V., & Dick, P. (2017). Social Constructionism. In *The Palgrave Handbook of Critical Social Psychology* (pp. 59–80). Palgrave Macmillan UK. https://doi.org/10.1057/978-1-137-51018-1_4

Bushman, B. J. (2002). Does Venting Anger Feed or Extinguish the Flame? Catharsis, Rumination, Distraction, Anger, and Aggressive Responding. *Personality and Social Psychology Bulletin*, *28*(6), 724–731. https://doi.org/10.1177/0146167202289002

Butler, E. A., Wilhelm, F. H., & Gross, J. J. (2006). Respiratory sinus arrhythmia, emotion, and emotion regulation during social interaction. *Psychophysiology*, *43*(6), 612–622. https://doi.org/10.1111/j.1469-8986.2006.00467.x

Byrne, B. M. (2016). *Structural Equation Modeling With AMOS*. Routledge. https://doi.org/10.4324/9781315757421

Cacioppo, S., Frum, C., Asp, E., Weiss, R. M., Lewis, J. W., & Cacioppo, J. T. (2013). A Quantitative Meta-Analysis of Functional Imaging Studies of Social Rejection. *Scientific Reports*, *3*(1), 2027. https://doi.org/10.1038/srep02027

Cambridge University Press. (2021). Definition of 'Fuck'. In *Cambridge Advanced Learner's Dictionary & Thesaurus* .

Campbell, M. D. (2018). *Behind the Name: the Etymology and History of First Names*. Retrieved from Https://Www.Behindthename.Com/.

Campos, J. J., Walle, E. A., Dahl, A., & Main, A. (2011). Reconceptualizing Emotion Regulation. *Emotion Review*, *3*(1), 26–35. https://doi.org/10.1177/1754073910380975

Carlsen, B., & Glenton, C. (2011). What about N? A methodological study of sample-size reporting in focus group studies. *BMC Medical Research Methodology*, *11*(1), 26. https://doi.org/10.1186/1471-2288-11-26

Carroll, J. M., & Russell, J. A. (1996). Do facial expressions signal specific emotions? Judging emotion from the face in context. *Journal of Personality and Social Psychology*, *70*(2), 205–218. https://doi.org/10.1037/0022-3514.70.2.205

Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology*, *56*(2), 267–283. https://doi.org/10.1037/0022-3514.56.2.267

Casey, B. J., Jones, R. M., & Somerville, L. H. (2011). Braking and Accelerating of the Adolescent Brain. *Journal of Research on Adolescence*, *21*(1), 21–33. https://doi.org/10.1111/j.1532-7795.2010.00712.x

Catanzaro, S. J., & Mearns, J. (1990). Measuring Generalized Expectancies for Negative Mood Regulation: Initial Scale Development and Implications. *Journal of Personality Assessment*, *54*(3–4), 546–563. https://doi.org/10.1080/00223891.1990.9674019

Certeau, M. de. (1984). *The practice of everyday life. Berkeley*. CA: University of California Press.

Cha, E.-S., Kim, K. H., & Erlen, J. A. (2007). Translation of scales in cross-cultural research: issues and techniques. *Journal of Advanced Nursing*, *58*(4), 386–395. https://doi.org/10.1111/j.1365-2648.2007.04242.x

Charles, S. T., & Carstensen, L. L. (2010). Social and Emotional Aging. *Annual Review of Psychology*, *61*(1), 383–409. https://doi.org/10.1146/annurev.psych.093008.100448

Chida, Y., & Steptoe, A. (2008). Positive Psychological Well-Being and Mortality: A Quantitative Review of Prospective Observational Studies. *Psychosomatic Medicine*, *70*(7), 741–756. https://doi.org/10.1097/PSY.0b013e31818105ba

Chomsky, N. (2005). Three Factors in Language Design. *Linguistic Inquiry*, *36*(1), 1–22. https://doi.org/10.1162/0024389052993655

Christopher, J. C. (1999). Situating Psychological Well-Being: Exploring the Cultural Roots of Its Theory and Research. *Journal of Counseling & Development*, *77*(2), 141–152. https://doi.org/10.1002/j.1556-6676.1999.tb02434.x

Clarke, L., Robertson, O. M., & Shore, D. M. (2022, September 9). The role of verbal speech on intra and interpersonal emotion processes. Retrieved from osf.io/qtuwn

Clarke, V., & Braun, V. (2013). *Successful qualitative research: A practical guide for beginners.* (M. Carmichael, Ed.). Sage Publications Ltd.

Clark, L., Fairhurst, C., & Torgerson, D. J. (2016). Allocation concealment in randomised controlled trials: are we getting better? *BMJ*, i5663. https://doi.org/10.1136/bmj.i5663

Code, L. (1991). *What Can She Know?: Feminist Theory and the Construction of Knowledge*. Cornell University Press.

Coifman, K. G., & Summers, C. B. (2019). Understanding Emotion Inflexibility in Risk for Affective Disease: Integrating Current Research and Finding a Path Forward. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.00392

Colombetti, G. (2005). Appraising valence. *Journal of Consciousness Studies*, *12*, 103–126.

Colombo, D., Fernández-Álvarez, J., Suso-Ribera, C., Cipresso, P., Valev, H., Leufkens, T., Sas, C., Garcia-Palacios, A., Riva, G., & Botella, C. (2020). The need for change: Understanding emotion regulation antecedents and consequences using ecological momentary assessment. *Emotion*, *20*(1), 30–36. https://doi.org/10.1037/emo0000671

Colzato, L. S., Sellaro, R., & Beste, C. (2017). Darwin revisited: The vagus nerve is a causal element in controlling recognition of other's emotions. *Cortex*, *92*, 95–102. https://doi.org/10.1016/j.cortex.2017.03.017

Comrey, A. L., & Lee, H. B. (1992). Interpretation and application of factor analytic results. *Comrey AL, Lee HB. A First Course in Factor Analysis*, *2*, 1992.

Coolican, H., & Flanagan, C. (2005). The study lacks ecological validity. *Psychology Review*, *11*(3), 24–26.

Cooter, R., & Pumfrey, S. (1994). Separate Spheres and Public Places: Reflections on the History of Science Popularization and Science in Popular Culture. *History of Science*, *32*(3), 237–267. https://doi.org/10.1177/007327539403200301

Cope, D. G. (2014). Methods and Meanings: Credibility and Trustworthiness of Qualitative Research. *Oncology Nursing Forum*, *41*(1), 89–91. https://doi.org/10.1188/14.ONF.89-91

Coppin, G., & Sander, D. (2021). Theoretical approaches to emotion and its measurement. In *Emotion Measurement* (pp. 3–37). Elsevier. https://doi.org/10.1016/B978-0-12-821124-3.00001-6

Costa, P. A., Tasker, F., Ramos, C., & Leal, I. (2020a). Psychometric properties of the parent's versions of the SDQ and the PANAS-X in a community sample of Portuguese parents. *Clinical Child Psychology and Psychiatry*, *25*(2), 520–532. https://doi.org/10.1177/1359104519891759

Costa, P. A., Tasker, F., Ramos, C., & Leal, I. (2020b). Psychometric properties of the parent's versions of the SDQ and the PANAS-X in a community sample of Portuguese parents. *Clinical Child Psychology and Psychiatry*, *25*(2), 520–532. https://doi.org/10.1177/1359104519891759

Cotigă, M. I. (2012). Development and validation of a Romanian version of the expanded version of Positive and Negative Affect Schedule (PANAS-X). *Procedia - Social and Behavioral Sciences*, *33*, 248–252. https://doi.org/10.1016/j.sbspro.2012.01.121

Creswell, J. W., & Clark, V. L. P. (2017). *Designing and conducting mixed methods research*. Sage publications.

Creswell, J. W., Plano Clark, V., Gutmann, M., & Hanson, W. (2003). Advanced mixed methods research designs. In A. Tashakkori & C. Teddle (Eds.), *Handbook of mixed methods in social and behavioral research* (pp. 209–240). Sage.

Crivelli, C., & Fridlund, A. J. (2019). Inside-Out: From Basic Emotions Theory to the Behavioral Ecology View. *Journal of Nonverbal Behavior*, *43*(2), 161–194. https://doi.org/10.1007/s10919-019-00294-2

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, *16*(3), 297–334. https://doi.org/10.1007/BF02310555

Culpeper, J., Shauer, G., Marti, L., Mei, M., & Nevala, M. (2014). Impoliteness and emotions in a cross cultural perspective. *SPELL: Swiss Papers in English Language and Literature*, *30*, 67–88.

Cunningham, W. A., Dunfield, K., & Stillman, P. E. (2015). Affect dynamics: Iterative reprocessing in the production of emotional responses. In *The psychological construction of emotion.* (pp. 168–182). The Guilford Press.

D'Agostino, A., Covanti, S., Rossi Monti, M., & Starcevic, V. (2017a). Reconsidering Emotion Dysregulation. *Psychiatric Quarterly*, *88*(4), 807–825. https://doi.org/10.1007/s11126-017-9499-6

D'Agostino, A., Covanti, S., Rossi Monti, M., & Starcevic, V. (2017b). Reconsidering Emotion Dysregulation. *Psychiatric Quarterly*, *88*(4), 807–825. https://doi.org/10.1007/s11126-017-9499-6

D'Andrea, E., & Barbaix, E. (2006). Anatomic research on the perioral muscles, functional matrix of the maxillary and mandibular bones. *Surgical and Radiologic Anatomy*, *28*(3), 261–266. https://doi.org/10.1007/s00276-006-0095-y

Darwin, C. (1872). *The expression of the emotions in man and animal*.

Davidson, R. J. (1992). Anterior cerebral asymmetry and the nature of emotion. *Brain and Cognition*, *20*(1), 125–151. https://doi.org/10.1016/0278-2626(92)90065-T

Davidson, R. J. (1998). Anterior electrophysiological asymmetries, emotion, and depression: Conceptual and methodological conundrums. *Psychophysiology*, *35*(5), S0048577298000134. https://doi.org/10.1017/S0048577298000134

Davidson, R. J. (2015). Comment: Affective Chronometry Has Come of Age. *Emotion Review*, *7*(4), 368–370. https://doi.org/10.1177/1754073915590844

Dejonckheere, E., Mestdagh, M., Houben, M., Rutten, I., Sels, L., Kuppens, P., & Tuerlinckx, F. (2019). Complex affect dynamics add limited information to the prediction of psychological well-being. *Nature Human Behaviour*, *3*(5), 478–491. https://doi.org/10.1038/s41562-019-0555-0

de Leersnyder, J., Boiger, M., & Mesquita, B. (2013). Cultural regulation of emotion: individual, relational, and structural sources. *Frontiers in Psychology*, *4*. https://doi.org/10.3389/fpsyg.2013.00055

Denissen, J. J. A., Geenen, R., van Aken, M. A. G., Gosling, S. D., & Potter, J. (2008). Development and Validation of a Dutch Translation of the Big Five Inventory (BFI). *Journal of Personality Assessment*, *90*(2), 152–157. https://doi.org/10.1080/00223890701845229

Dennis, T. A., Buss, K. A., Hastings, P. D., Bell, M. A., Diaz, A., Adam, E. K., Miskovic, V., Schmidt, L. A., Feldman, R., Katz, L. F., Rigterink, T., Strang, N. M., Hanson, J. L., Pollak, S. D., Dahl, R. E., Silk, J. S., Siegle, G. J., Beauchaine, T. P., Cicchetti, D., … Gates, K. M. (2012). Physiological Measures of Emotion From a Developmental

Perspective: State of the Science . *Monographs of the Society for Research in Child Development*, *77*(2), 1–204.

Denson, T. F., Grisham, J. R., & Moulds, M. L. (2011). Cognitive reappraisal increases heart rate variability in response to an anger provocation. *Motivation and Emotion*, *35*(1), 14–22. https://doi.org/10.1007/s11031-011-9201-5

DeWall, C. N., & Baumeister, R. F. (2006). Alone but feeling no pain: Effects of social exclusion on physical pain tolerance and pain threshold, affective forecasting, and interpersonal empathy. *Journal of Personality and Social Psychology*, *91*(1), 1–15. https://doi.org/10.1037/0022-3514.91.1.1

DeWall, C. N., Deckman, T., Pond, R. S., & Bonser, I. (2011). Belongingness as a Core Personality Trait: How Social Exclusion Influences Social Functioning and Personality Expression. *Journal of Personality*, *79*(6), 1281–1314. https://doi.org/10.1111/j.1467-6494.2010.00695.x

DeWall, C. N., MacDonald, G., Webster, G. D., Masten, C. L., Baumeister, R. F., Powell, C., Combs, D., Schurtz, D. R., Stillman, T. F., Tice, D. M., & Eisenberger, N. I. (2010). Acetaminophen Reduces Social Pain. *Psychological Science*, *21*(7), 931–937. https://doi.org/10.1177/0956797610374741

Dewey, J. (1895). The theory of emotion. *Psychological Review*, *2*(1), 13–32. https://doi.org/10.1037/h0070927

DiFRANCESCO, D., MORONI, A., BARUSCOTT, M., & ACCILI, E. A. (2001). Cardiac Pacemaker Currents. In *Heart Physiology and Pathophysiology* (pp. 357–372). Elsevier. https://doi.org/10.1016/B978-012656975-9/50020-1

Dixon, T. (2021, April 14). Past Feeling: Emotions in Science and History. *Society for Affective Science Annual Conference*.

Dobson, C., & Ellis, J. (2021). *Investigating the hypoalgesic effects of swearing on autobiographical pain memories.* [Bachelors Degree in Psychology]. University of Reading.

Docter, P., del Carmen, R., le Fauve, M., & Cooley, J. (2015). *Inside Out*. Pixar Animation Studios/Walt Disney Pictures.

DONG, J.-G. (2016). The role of heart rate variability in sports physiology. *Experimental and Therapeutic Medicine*, *11*(5), 1531–1536. https://doi.org/10.3892/etm.2016.3104

Doré, B. P., Silvers, J. A., & Ochsner, K. N. (2016). Toward a Personalized Science of Emotion Regulation. *Social and Personality Psychology Compass*, *10*(4), 171–187. https://doi.org/10.1111/spc3.12240

Dowling, M. (2008). Reflexivity. *The SAGE Encyclopedia of Qualitative Research Methods*, *2*, 747–748.

Duarte, J., & Pinto-Gouveia, J. (2017). Positive affect and parasympathetic activity: Evidence for a quadratic relationship between feeling safe and content and heart rate variability. *Psychiatry Research*, *257*, 284–289. https://doi.org/10.1016/j.psychres.2017.07.077

Durán, J. I., & Fernández-Dols, J.-M. (2021). Do emotions result in their predicted facial expressions? A meta-analysis of studies on the co-occurrence of expression and emotion. *Emotion*, *21*(7), 1550–1569. https://doi.org/10.1037/emo0001015

Earle, S., & Blackburn, M. (2021). Involving young people with life-limiting conditions in research on sex: the intersections of taboo and vulnerability. *International Journal of Social Research Methodology*, *24*(5), 545–551. https://doi.org/10.1080/13645579.2020.1857968

Edelman, G. M., & Gally, J. A. (2001). Degeneracy and complexity in biological systems. *Proceedings of the National Academy of Sciences*, *98*(24), 13763–13768. https://doi.org/10.1073/pnas.231499798

Edelman, N., & Barron, D. (2016). Evaluation of public involvement in research: time for a major re-think? *Journal of Health Services Research & Policy*, *21*(3), 209–211. https://doi.org/10.1177/1355819615612510

Egger, M., Jüni, P., Bartlett, C., Holenstein, F., & Sterne, J. (2003). How important are comprehensive literature searches and the assessment of trial quality in systematic reviews? Empirical study. *Health Technology Assessment*, *7*(1), 1–82. https://doi.org/10.3310/hta7010

Eisenberger, N. I. (2012). The pain of social disconnection: examining the shared neural underpinnings of physical and social pain. *Nature Reviews Neuroscience*, *13*(6), 421–434. https://doi.org/10.1038/nrn3231

Eisenberger, N. I. (2015). Social Pain and the Brain: Controversies, Questions, and Where to Go from Here. *Annual Review of Psychology*, *66*(1), 601–629. https://doi.org/10.1146/annurev-psych-010213-115146

Eisenberger, N. I. (2016). Social pain and social pleasure: two overlooked but fundamental mammalian emotions? . In *The Handbook of Emotions* (pp. 440–452).

Eisenberger, N. I., Jarcho, J. M., Lieberman, M. D., & Naliboff, B. D. (2006). An experimental study of shared sensitivity to physical pain and social rejection. *Pain*, *126*(1), 132–138. https://doi.org/10.1016/j.pain.2006.06.024

Eisenberger, N. I., Lieberman, M. D., & Williams, K. D. (2003). Does Rejection Hurt? An fMRI Study of Social Exclusion. *Science*, *302*(5643), 290–292. https://doi.org/10.1126/science.1089134

Ekman, P. (1965). Differential communication of affect by head and body cues. *Journal of Personality and Social Psychology*, *2*(5), 726–735. https://doi.org/10.1037/h0022736

Ekman, P. (1984). Expression and the nature of emotion. *Approaches to Emotion*, *3*(19), 344.

Ekman, P. (1992). Are there basic emotions? *Psychological Review*, *99*(3), 550–553. https://doi.org/10.1037/0033-295X.99.3.550

Ekman, P. (1994). Strong evidence for universals in facial expressions: A reply to Russell's mistaken critique. *Psychological Bulletin*, *115*(2), 268–287. https://doi.org/10.1037/0033-2909.115.2.268

Ekman, P. (2005). Basic Emotions. In *Handbook of Cognition and Emotion* (pp. 45–60). John Wiley & Sons, Ltd. https://doi.org/10.1002/0470013494.ch3

Ekman, P. (2016). What Scientists Who Study Emotion Agree About. *Perspectives on Psychological Science*, *11*(1), 31–34. https://doi.org/10.1177/1745691615596992

Ekman, P. (2018). How emotions might work. In A. S. Fox, R. C. LApate, A. J. Shackman, & R. J. Davidson (Eds.), *The nature of emotion: Fundamental questions* (2nd ed., pp. xxvi–xxxv). Oxford University Press.

Ekman, P., & Cordaro, D. (2011). What is Meant by Calling Emotions Basic. *Emotion Review*, *3*(4), 364–370. https://doi.org/10.1177/1754073911410740

Ekman, P., & Friesen, W. v. (1982). Felt, false, and miserable smiles. *Journal of Nonverbal Behavior*, *6*(4), 238–252. https://doi.org/10.1007/BF00987191

Ekman, P., Levenson, R. W., & Friesen, W. v. (1983). Autonomic Nervous System Activity Distinguishes Among Emotions. *Science*, *221*(4616), 1208–1210. https://doi.org/10.1126/science.6612338

Elfenbein, H. A., Beaupré, M., Lévesque, M., & Hess, U. (2007). Toward a dialect theory: Cultural differences in the expression and recognition of posed facial expressions. *Emotion*, *7*(1), 131–146. https://doi.org/10.1037/1528-3542.7.1.131

Ellis, C., & Berger, L. (2003). Their story/my story/our story: Including the researcher's experience in interview research. *Postmodern Interviewing*, 157–183.

Ellsworth, P. C. (2014). Basic Emotions and the Rocks of New Hampshire. *Emotion Review*, *6*(1), 21–26. https://doi.org/10.1177/1754073913494897

English, T., Lee, I. A., John, O. P., & Gross, J. J. (2017). Emotion regulation strategy selection in daily life: The role of social context and goals. *Motivation and Emotion*, *41*(2), 230–242. https://doi.org/10.1007/s11031-016-9597-z

Fajans, J. (1983). Shame, Social Action, and the Person among the Baining. *Ethos*, *11*(3), 166–180. http://www.jstor.org/stable/639971

Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. https://doi.org/10.3758/BF03193146

Felski, R. (2000). *Doing time: Feminist theory and postmodern culture* (Vol. 11). NYU Press.

Fern, E. F. (1982). The use of Focus Groups for Idea Generation: The Effects of Group Size, Acquaintanceship, and Moderator on Response Quantity and Quality. *Journal of Marketing Research*, *19*(1), 1–13. https://doi.org/10.1177/002224378201900101

Ferreira, M. J., Sofia, R., Carreno, D. F., Eisenbeck, N., Jongenelen, I., & Cruz, J. F. A. (2021). Dealing With the Pandemic of COVID-19 in Portugal: On the Important Role of Positivity, Experiential Avoidance, and Coping Strategies. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.647984

Fielding, N., & Schreier, M. (2001). On the Compatibility between Qualitative and Quantitative Research Methods . *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, *2*(1).

Finlay, L. (2002). "Outing" the Researcher: The Provenance, Process, and Practice of Reflexivity. *Qualitative Health Research*, *12*(4), 531–545. https://doi.org/10.1177/104973202129120052

Fishbach, A., & Ferguson, M. J. (2007). The goal construct in social psychology. In A. W. Kruglanski & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (pp. 490–515). The Guilford Press.

Fitch, W. T. (2000). The evolution of speech: a comparative review. *Trends in Cognitive Sciences*, *4*(7), 258–267. https://doi.org/10.1016/S1364-6613(00)01494-7

Flake, J. K., & Fried, E. I. (2020). Measurement Schmeasurement: Questionable Measurement Practices and How to Avoid Them. *Advances in Methods and Practices in Psychological Science*, *3*(4), 456–465. https://doi.org/10.1177/2515245920952393

Flick, U. (1992). Combining methods-lack of methodology: discussion of Sotirakopoulou & Breakwell. *Papers on Social Representations*, *1*, 43–48.

Flick, U., Foster, J., & Caillaud, S. (2015). Researching social representations. *The Cambridge Handbook of Social Representations*, *3*(1), 64–80.

Ford, B. Q., & Gross, J. J. (2019). Why Beliefs About Emotion Matter: An Emotion-Regulation Perspective. *Current Directions in Psychological Science*, *28*(1), 74–81. https://doi.org/10.1177/0963721418806697

Ford, B. Q., Gross, J. J., & Gruber, J. (2019). Broadening Our Field of View: The Role of Emotion Polyregulation. *Emotion Review*, *11*(3), 197–208. https://doi.org/10.1177/1754073919850314

Fort, K., Adda, G., & Cohen, K. B. (2011). Amazon Mechanical Turk: Gold Mine or Coal Mine? *Computational Linguistics* , *37*(2), 413–420.

Fox, A. S., Lapate, R. C., Shackman, A. J., & Davidson, R. J. (2018). *The nature of emotion: Fundamental questions*. Oxford University Press.

Fridlund, A. J. (1992). The behavioral ecology and sociality of human faces. In *Emotion.* (pp. 90–121). Sage Publications, Inc.

Fridman, J., Barrett, L. F., Wormwood, J. B., & Quigley, K. S. (2019). Applying the Theory of Constructed Emotion to Police Decision Making. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.01946

Frijda, N. H., & Scherer, K. R. (2009). Emotion definitions (psychological perspectives). *The Oxford Companion to Emotion and the Affective Sciences*, 142–144.

Fritsch, J., & Jekauc, D. (2020). Self-talk and emotion regulation. In *Self-talk in Sport* (pp. 64–76). Routledge.

Galambos, N. L., Barker, E. T., & Krahn, H. J. (2006). Depression, self-esteem, and anger in emerging adulthood: Seven-year trajectories. *Developmental Psychology*, *42*(2), 350–365. https://doi.org/10.1037/0012-1649.42.2.350

Garfinkel, H. (2016). Studies in ethnomethodology. In *Social Theory Re-Wired* (pp. 85–95). Routledge.

Garra, G., Singer, A. J., Taira, B. R., Chohan, J., Cardoz, H., Chisena, E., & Thode, H. C. (2010). Validation of the Wong-Baker FACES Pain Rating Scale in Pediatric Emergency Department Patients. *Academic Emergency Medicine*, *17*(1), 50–54. https://doi.org/10.1111/j.1553-2712.2009.00620.x

Gaspar, A., Esteves, F., & Arriaga, P. (2014). *On Prototypical Facial Expressions Versus Variation in Facial Behavior: What Have We Learned on the "Visibility" of Emotions from Measuring Facial Actions in Humans and Apes* (pp. 101–126). https://doi.org/10.1007/978-3-319-02669-5_6

Gaudreau, P., Sanchez, X., & Blondin, J.-P. (2006). Positive and Negative Affective States in a Performance-Related Setting. *European Journal of Psychological Assessment*, *22*(4), 240–249. https://doi.org/10.1027/1015-5759.22.4.240

Geisler, F. C. M., Vennewald, N., Kubiak, T., & Weber, H. (2010). The impact of heart rate variability on subjective well-being is mediated by emotion regulation. *Personality and Individual Differences*, *49*(7), 723–728. https://doi.org/10.1016/j.paid.2010.06.015

Gendron, M., & Feldman Barrett, L. (2009). Reconstructing the Past: A Century of Ideas About Emotion in Psychology. *Emotion Review*, *1*(4), 316–339. https://doi.org/10.1177/1754073909338877

Gendron, M., Hoemann, K., Crittenden, A. N., Mangola, S. M., Ruark, G. A., & Barrett, L. F. (2020). Emotion Perception in Hadza Hunter-Gatherers. *Scientific Reports*, *10*(1), 3867. https://doi.org/10.1038/s41598-020-60257-2

Gerber, J. P., Chang, S.-H., & Reimel, H. (2017). Construct validity of Williams' ostracism needs threat scale. *Personality and Individual Differences*, *115*, 50–53. https://doi.org/10.1016/j.paid.2016.07.008

Giacalone, M., Agata, Z., Cozzucoli, P. C., & Alibrandi, A. (2018). Bonferroni-Holm and permutation tests to compare health data: methodological and applicative issues. *BMC Medical Research Methodology*, *18*(1), 81. https://doi.org/10.1186/s12874-018-0540-8

Gibson, J. J. (1979). The Theory of Affordances. In *The Ecological Approach to Visual Perception* (pp. 127–137). Houghton Mifflin.

Gilam, G., Gross, J. J., Wager, T. D., Keefe, F. J., & Mackey, S. C. (2020). What Is the Relationship between Pain and Emotion? Bridging Constructs and Communities. *Neuron*, *107*(1), 17–21. https://doi.org/10.1016/j.neuron.2020.05.024

Goerlich, K. S. (2018). The Multifaceted Nature of Alexithymia – A Neuroscientific Perspective. *Frontiers in Psychology*, *9*. https://doi.org/10.3389/fpsyg.2018.01614

Gonsalkorale, K., & Williams, K. D. (2007). The KKK won't let me play: ostracism even by a despised outgroup hurts. *European Journal of Social Psychology*, *37*(6), 1176–1186. https://doi.org/10.1002/ejsp.392

Goodwin, R. D., & Friedman, H. S. (2006). Health Status and the Five-factor Personality Traits in a Nationally Representative Sample. *Journal of Health Psychology*, *11*(5), 643–654. https://doi.org/10.1177/1359105306066610

Gordan, R., Gwathmey, J. K., & Xie, L.-H. (2015). Autonomic and endocrine control of cardiovascular function. *World Journal of Cardiology*, *7*(4), 204. https://doi.org/10.4330/wjc.v7.i4.204

Gosling, S. D., Vazire, S., Srivastava, S., & John, O. P. (2004). Should We Trust Web-Based Studies? A Comparative Analysis of Six Preconceptions About Internet Questionnaires. *American Psychologist*, *59*(2), 93–104. https://doi.org/10.1037/0003-066X.59.2.93

Grandey, A. A., Dickter, D. N., & Sin, H.-P. (2004). The customer is not always right: customer aggression and emotion regulation of service employees. *Journal of Organizational Behavior*, *25*(3), 397–418. https://doi.org/10.1002/job.252

Gratz, K. L., & Roemer, L. (2004). Multidimensional Assessment of Emotion Regulation and Dysregulation: Development, Factor Structure, and Initial Validation of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment*, *26*(1), 41–54. https://doi.org/10.1023/B:JOBA.0000007455.08539.94

Gratz, K. L., & Tull, M. T. (2010). Emotion regulation as a mechanism of change in acceptance- and mindfulness-based treatments. In *Assessing mindfulness and acceptance processes in clients: Illuminating the theory and practice of change.* (pp. 107–133). Context Press/New Harbinger Publications.

Green, D. P., Goldman, S. L., & Salovey, P. (1993). Measurement error masks bipolarity in affect ratings. *Journal of Personality and Social Psychology*, *64*(6), 1029–1041. https://doi.org/10.1037/0022-3514.64.6.1029

Greenhalgh, T., Hinton, L., Finlay, T., Macfarlane, A., Fahy, N., Clyde, B., & Chant, A. (2019). Frameworks for supporting patient and public involvement in research: Systematic review and co-design pilot. *Health Expectations*, *22*(4), 785–801. https://doi.org/10.1111/hex.12888

Gross, J. J. (1998). The Emerging Field of Emotion Regulation: An Integrative Review. *Review of General Psychology*, *2*(3), 271–299. https://doi.org/10.1037/1089-2680.2.3.271

Gross, J. J. (1999). Emotion Regulation: Past, Present, Future. *Cognition & Emotion*, *13*(5), 551–573. https://doi.org/10.1080/026999399379186

Gross, J. J. (2014). Emotion regulation: Conceptual and empirical foundations. In *Handbook of emotion regulation, 2nd ed.* (pp. 3–20). The Guilford Press.

Gross, J. J. (2015). Emotion Regulation: Current Status and Future Prospects. *Psychological Inquiry*, *26*(1), 1–26. https://doi.org/10.1080/1047840X.2014.940781

Gross, J. J., & Feldman Barrett, L. (2011). Emotion Generation and Emotion Regulation: One or Two Depends on Your Point of View. *Emotion Review*, *3*(1), 8–16. https://doi.org/10.1177/1754073910380974

Gross, J. J., Richards, J. M., & John, O. P. (2006). Emotion Regulation in Everyday Life. In *Emotion regulation in couples and families: Pathways to dysfunction and health.* (pp. 13–35). American Psychological Association. https://doi.org/10.1037/11468-001

Grühn, D., Kotter-Grühn, D., & Röcke, C. (2010). Discrete affects across the adult lifespan: Evidence for multidimensionality and multidirectionality of affective experiences in young, middle-aged and older adults. *Journal of Research in Personality*, *44*(4), 492–500. https://doi.org/10.1016/j.jrp.2010.06.003

Guest, G., Bunce, A., & Johnson, L. (2006). How Many Interviews Are Enough? *Field Methods*, *18*(1), 59–82. https://doi.org/10.1177/1525822X05279903

Guttman, L. (1954). A new approach to factor analysis: the Radex. In *Mathematical thinking in the social sciences.* (pp. 258–348). Free Press.

Hair, J. F. (2009). *Multivariate Data Analysis: A Global Perspective* (Vol. 7). Prentice Hall.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a Silver Bullet. *Journal of Marketing Theory and Practice*, *19*(2), 139–152. https://doi.org/10.2753/MTP1069-6679190202

Hardy, J. (2006). Speaking clearly: A critical review of the self-talk literature. *Psychology of Sport and Exercise*, *7*(1), 81–97. https://doi.org/10.1016/j.psychsport.2005.04.002

Hartgerink, C. H. J., van Beest, I., Wicherts, J. M., & Williams, K. D. (2015). The Ordinal Effects of Ostracism: A Meta-Analysis of 120 Cyberball Studies. *PLOS ONE*, *10*(5), e0127002. https://doi.org/10.1371/journal.pone.0127002

Hastings, P. D., Nuselovici, J. N., Utendale, W. T., Coutya, J., McShane, K. E., & Sullivan, C. (2008). Applying the polyvagal theory to children's emotion regulation: Social context, socialization, and adjustment. *Biological Psychology*, *79*(3), 299–306. https://doi.org/10.1016/j.biopsycho.2008.07.005

Heathers, J. A. J. (2014). Everything Hertz: methodological issues in short-term frequency-domain HRV. *Frontiers in Physiology*, *5*. https://doi.org/10.3389/fphys.2014.00177

Heller, Á. (2015). *Everyday Life*. Routledge. https://doi.org/10.4324/9781315682495

Helm, J. L., Miller, J. G., Kahle, S., Troxel, N. R., & Hastings, P. D. (2018). On Measuring and Modeling Physiological Synchrony in Dyads. *Multivariate Behavioral Research*, *53*(4), 521–543. https://doi.org/10.1080/00273171.2018.1459292

Hesp, C., Smith, R., Parr, T., Allen, M., Friston, K. J., & Ramstead, M. J. D. (2021). Deeply Felt Affect: The Emergence of Valence in Deep Active Inference. *Neural Computation*, *33*(2), 398–446. https://doi.org/10.1162/neco_a_01341

Hess, U., Senécal, S., Kirouac, G., Herrera, P., Philippot, P., & Kleck, R. E. (2000). Emotional expressivity in men and women: Stereotypes and self-perceptions. *Cognition & Emotion*, *14*(5), 609–642. https://doi.org/10.1080/02699930050117648

Higgins, J. P., Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M. J., & Welch, V. A. (2019). *Cochrane handbook for systematic reviews of interventions*. John Wiley & Sons.

Hill, L. K., Siebenbrock, A., Sollers III, J. J., & Thayer, J. F. (2009). Are All Measures Created Equal? Heart Rate Variability and Respiration. *Biomedical Sciences Instrumentation*, *45*, 71–76.

Hill, R. D., van Boxtel, M. P. J., Ponds, R., Houx, P. J., & Jolles, J. (2005). Positive affect and its relationship to free recall memory performance in a sample of older Dutch adults from the Maastricht Aging Study. *International Journal of Geriatric Psychiatry*, *20*(5), 429–435. https://doi.org/10.1002/gps.1300

Hoegen, R., Gratch, J., Parkinson, B., & Shore, D. (2019). Signals of Emotion Regulation in a Social Dilemma: Detection from Face and Context. *2019 8th International Conference on Affective Computing and Intelligent Interaction (ACII)*, 1–7. https://doi.org/10.1109/ACII.2019.8925478

Hoemann, K. (2020). *Emotional granularity : definition, measurement, and relationship to cardiovascular physiological activity* [Northeastern University]. https://doi.org/10.17760/D20382016

Hoemann, K., Devlin, M., & Barrett, L. F. (2020). Comment: Emotions Are Abstract, Conceptual Categories That Are Learned by a Predicting Brain. *Emotion Review*, *12*(4), 253–255. https://doi.org/10.1177/1754073919897296

Hoemann, K., & Feldman Barrett, L. (2019). Concepts dissolve artificial boundaries in the study of emotion and cognition, uniting body, brain, and mind. *Cognition and Emotion*, *33*(1), 67–76. https://doi.org/10.1080/02699931.2018.1535428

Hoemann, K., Gendron, M., & Barrett, L. F. (2017). Mixed emotions in the predictive brain. *Current Opinion in Behavioral Sciences*, *15*, 51–57. https://doi.org/10.1016/j.cobeha.2017.05.013

Hoemann, K., Xu, F., & Barrett, L. F. (2019). Emotion words, emotion concepts, and emotional development in children: A constructionist hypothesis. *Developmental Psychology*, *55*(9), 1830–1849. https://doi.org/10.1037/dev0000686

Holm, S. (1979). A Simple Sequentially Rejective Multiple Test Procedure . *Scandinavian Journal of Statistics* , *6*(2), 65–70.

Holzman, J. B., & Bridgett, D. J. (2017). Heart rate variability indices as bio-markers of top-down self-regulatory mechanisms: A meta-analytic review. *Neuroscience & Biobehavioral Reviews*, *74*, 233–255. https://doi.org/10.1016/j.neubiorev.2016.12.032

Honkalampi, K., Hintikka, J., Tanskanen, A., Lehtonen, J., & Viinamäki, H. (2000). Depression is strongly associated with alexithymia in the general population. *Journal of Psychosomatic Research*, *48*(1), 99–104. https://doi.org/10.1016/S0022-3999(99)00083-5

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Hult Khazaie, A. K. D., & others. (2021). *The aggravation and mitigation of mass gathering-associated health risks: a social identity perspective*. Keele University.

Hunt, M. R., Mehta, A., & Chan, L. S. (2009). Learning to Think Qualitatively: Experiences of Graduate Students Conducting Qualitative Health Research. *International Journal of Qualitative Methods*, *8*(2), 129–135. https://doi.org/10.1177/160940690900800204

Hutchinson, J. B., & Barrett, L. F. (2019). The Power of Predictions: An Emerging Paradigm for Psychological Research. *Current Directions in Psychological Science*, *28*(3), 280–291. https://doi.org/10.1177/0963721419831992

Inagaki, T. K., Hazlett, L. I., & Andreescu, C. (2020). Opioids and social bonding: Effect of naltrexone on feelings of social connection and ventral striatum activity to close others. *Journal of Experimental Psychology: General*, *149*(4), 732–745. https://doi.org/10.1037/xge0000674

Inquisit 5. (2016). Retrieved from https://www.millisecond.com.

Jackson, J. C., Jong, J., Bilkey, D., Whitehouse, H., Zollmann, S., McNaughton, C., & Halberstadt, J. (2018). Synchrony and Physiological Arousal Increase Cohesion and Cooperation in Large Naturalistic Groups. *Scientific Reports*, *8*(1), 127. https://doi.org/10.1038/s41598-017-18023-4

Jackson, J. C., Watts, J., List, J.-M., Puryear, C., Drabble, R., & Lindquist, K. A. (2022). From Text to Thought: How Analyzing Language Can Advance Psychological Science. *Perspectives on Psychological Science*, *17*(3), 805–826. https://doi.org/10.1177/17456916211004899

Jacoby, J., & Sassenberg, K. (2009). Is Being Excluded Boring? *10th Annual Society for Personality and Social Psychology Conference*.

Jager, G. (2021). Short-term time structure of food-related emotions. In *Emotion Measurement* (pp. 439–469). Elsevier. https://doi.org/10.1016/B978-0-12-821124-3.00013-2

James, W. (1884). What is an emotion? . *Mind*, *19*, 188–205.

James, W. (1948). What is emotion? 1884. In *Readings in the history of psychology.* (pp. 290–303). Appleton-Century-Crofts. https://doi.org/10.1037/11304-033

Jamieson, M. K., Govaart, G. H., & Pownall, M. (2022). Reflexivity in Quantitative Research: A Rationale and Beginner's Guide. In *PsyArXiv* (pp. 1–30).

Jay, T. (2009). The Utility and Ubiquity of Taboo Words. *Perspectives on Psychological Science*, *4*(2), 153–161. https://doi.org/10.1111/j.1745-6924.2009.01115.x

Jay, T., & Janschewitz, K. (2008). The pragmatics of swearing. *Journal of Politeness Research. Language, Behaviour, Culture*, *4*(2). https://doi.org/10.1515/JPLR.2008.013

Johnson, J. L. (1993). *A Descriptive Study of Gender Differences in Proscribed Language Behavior, Beliefs, and Attitudes*.

Johnson, R. B., Onwuegbuzie, A. J., & Turner, L. A. (2007). Toward a Definition of Mixed Methods Research. *Journal of Mixed Methods Research*, *1*(2), 112–133. https://doi.org/10.1177/1558689806298224

Kaholokula, J. K., Antonio, M. C. K., Ing, C. K. T., Hermosura, A., Hall, K. E., Knight, R., & Wills, T. A. (2017). The effects of perceived racism on psychological distress mediated by venting and disengagement coping in Native Hawaiians. *BMC Psychology*, *5*(1), 2. https://doi.org/10.1186/s40359-017-0171-6

Kajornboon, A. B. (2005). Using interviews as research instruments. *E-Journal for Research Teachers*, *2*(1), 1–9.

Kamath, M. v, & Fallen, E. L. (1995). Correction of heart rate variability signal for ectopics and missing beats. In M. Malik & A. J. Camm (Eds.), *Heart Rate Variability* (pp. 75–85). Futura.

Karapostolis, V. (1985). Thematization in Everyday Life: A Critical Approach. *The Sociological Review*, *33*(4), 691–707. https://doi.org/10.1111/j.1467-954X.1985.tb02445.x

Katz, A. M. (2010). *Physiology of the Heart*. Lippincott Williams & Wilkins.

Kaufmann, T., Sütterlin, S., Schulz, S. M., & Vögele, C. (2011). ARTiiFACT: a tool for heart rate artifact processing and heart rate variability analysis. *Behavior Research Methods*, *43*(4), 1161–1170. https://doi.org/10.3758/s13428-011-0107-7

Kay, J. B., & Banet-Weiser, S. (2019). Feminist anger and feminist respair. *Feminist Media Studies*, *19*(4), 603–609. https://doi.org/10.1080/14680777.2019.1609231

Kelemen, D., Rottman, J., & Seston, R. (2013). Professional physical scientists display tenacious teleological tendencies: Purpose-based reasoning as a cognitive default. *Journal of Experimental Psychology: General*, *142*(4), 1074–1083. https://doi.org/10.1037/a0030399

Kelle, U. (2005). Sociological Explanations between Micro and Macro and the Integration of Qualitative and Quantitative Methods. *Historical Social Research / Historische Sozialforschung*, *30*(1(111), 95–117.

Kelley, T. L. (1927). *Interpretation of educational measurements*. World Book Co.

Keltner, D., Sauter, D., Tracy, J., & Cowen, A. (2019). Emotional Expression: Advances in Basic Emotion Theory. *Journal of Nonverbal Behavior*, *43*(2), 133–160. https://doi.org/10.1007/s10919-019-00293-3

Keltner, D., Tracy, J. L., Sauter, D., & Cowen, A. (2019). What Basic Emotion Theory Really Says for the Twenty-First Century Study of Emotion. *Journal of Nonverbal Behavior*, *43*(2), 195–201. https://doi.org/10.1007/s10919-019-00298-y

Kensinger, E. A. (2009). Remembering the Details: Effects of Emotion. *Emotion Review*, *1*(2), 99–113. https://doi.org/10.1177/1754073908100432

Khan, K. S., Mamun, M. A., Griffiths, M. D., & Ullah, I. (2022). The Mental Health Impact of the COVID-19 Pandemic Across Different Cohorts. *International Journal of Mental Health and Addiction*, *20*(1), 380–386. https://doi.org/10.1007/s11469-020-00367-0

Kim, J., & Shin, W. (2014). How to Do Random Allocation (Randomization). *Clinics in Orthopedic Surgery*, *6*(1), 103. https://doi.org/10.4055/cios.2014.6.1.103

Kircanski, K., Lieberman, M. D., & Craske, M. G. (2012). Feelings Into Words: Contributions of Language to Exposure Therapy. *Psychological Science*, *23*(10), 1086–1091. https://doi.org/10.1177/0956797612443830

Kirschbaum, C., Pirke, K.-M., & Hellhammer, D. H. (1993). The 'Trier Social Stress Test' – A Tool for Investigating Psychobiological Stress Responses in a Laboratory Setting. *Neuropsychobiology*, *28*(1–2), 76–81. https://doi.org/10.1159/000119004

Kitayama, S., Mesquita, B., & Karasawa, M. (2006). Cultural affordances and emotional experience: Socially engaging and disengaging emotions in Japan and the United States. *Journal of Personality and Social Psychology*, *91*(5), 890–903. https://doi.org/10.1037/0022-3514.91.5.890

Kitzinger, J. (1995). Qualitative Research: Introducing focus groups. *BMJ*, *311*(7000), 299–302. https://doi.org/10.1136/bmj.311.7000.299

Kjaergard, L. L., Villumsen, J., & Gluud, C. (2001). Reported Methodologic Quality and Discrepancies between Large and Small Randomized Trials in Meta-Analyses. *Annals of Internal Medicine*, *135*(11), 982. https://doi.org/10.7326/0003-4819-135-11-200112040-00010

Kleinginna, P. R., & Kleinginna, A. M. (1981). A categorized list of emotion definitions, with suggestions for a consensual definition. *Motivation and Emotion*, *5*(4), 345–379. https://doi.org/10.1007/BF00992553

Kline, R. B. (2011). Principles and practice of structural equation modeling, 3rd ed. In *Principles and practice of structural equation modeling, 3rd ed.* Guilford Press.

Koenig, J., Rinnewitz, L., Warth, M., & Kaess, M. (2015). Autonomic nervous system and hypothalamic–pituitary–adrenal axis response to experimentally induced cold pain in adolescent non-suicidal self-injury – study protocol. *BMC Psychiatry*, *15*(1), 150. https://doi.org/10.1186/s12888-015-0544-4

Koole, S. L. (2009). The psychology of emotion regulation: An integrative review. *Cognition & Emotion*, *23*(1), 4–41. https://doi.org/10.1080/02699930802619031

Kosik, K. (2012). *Dialectics of the concrete: A study on problems of man and world* (Vol. 52). Springer Science & Business Media.

Koval, P., Kalokerinos, E. K., Greenaway, K. H., Medland, H., Kuppens, P., Nezlek, J. B., Hinton, J. D. X., & Gross, J. J. (2022). Emotion regulation in everyday life: Mapping global self-reports to daily processes. *Emotion*. https://doi.org/10.1037/emo0001097

Koval, P., Ogrinz, B., Kuppens, P., van den Bergh, O., Tuerlinckx, F., & Sütterlin, S. (2013). Affective Instability in Daily Life Is Predicted by Resting Heart Rate Variability. *PLoS ONE*, *8*(11), e81536. https://doi.org/10.1371/journal.pone.0081536

Kreibig, S. D. (2010). Autonomic nervous system activity in emotion: A review. *Biological Psychology*, *84*(3), 394–421. https://doi.org/10.1016/j.biopsycho.2010.03.010

Kremer, J. M., & Mullins, M. (2016). *AcqKnowledge 4 Software Guide (MP150, MP36R, Mobita, Stellar, or BioHarness)* (4.4).

Kreuger, R. A. (2014). *Focus Groups: A Practical Guide for Applied Research* (M. A. Casey, H. Salmon, & A. Villarruel, Eds.; 5th ed.). Sage Publications Inc.

Kross, E., Bruehlman-Senecal, E., Park, J., Burson, A., Dougherty, A., Shablack, H., Bremner, R., Moser, J., & Ayduk, O. (2014). Self-talk as a regulatory mechanism: How you do it matters. *Journal of Personality and Social Psychology*, *106*(2), 304–324. https://doi.org/10.1037/a0035173

Kruger, L. J., Rodgers, R. F., Long, S. J., & Lowy, A. S. (2019). Individual interviews or focus groups? Interview format and women's self-disclosure. *International Journal of Social Research Methodology*, *22*(3), 245–255. https://doi.org/10.1080/13645579.2018.1518857

Kuppens, F. J. M., & van Beest, I. (2013). *Social Pain And Cursing: Does Cursing Decrease the Negative Effects of Social Exclusion?* [Bachelors Degree]. Tilburg University.

Kuppens, P., & Verduyn, P. (2017). Emotion dynamics. *Current Opinion in Psychology*, *17*, 22–26. https://doi.org/10.1016/j.copsyc.2017.06.004

Kvale, S. (1995). The Social Construction of Validity. *Qualitative Inquiry*, *1*(1), 19–40. https://doi.org/10.1177/107780049500100103

Laborde, S., Mosley, E., & Thayer, J. F. (2017). Heart Rate Variability and Cardiac Vagal Tone in Psychophysiological Research – Recommendations for Experiment Planning, Data Analysis, and Data Reporting. *Frontiers in Psychology*, *08*. https://doi.org/10.3389/fpsyg.2017.00213

Lakatos, I. (1976). Falsification and the methodology of scientific research programmes. In *Can theories be refuted?* (pp. 205–259). Springer.

Lakatos, I. (1978). Science and pseudoscience. *Philosophical Papers*, *1*, 1–7.

Lambie, J. A., & Marcel, A. J. (2002). Consciousness and the varieties of emotion experience: A theoretical framework. *Psychological Review*, *109*(2), 219–259. https://doi.org/10.1037/0033-295X.109.2.219

Landers, R. N., & Behrend, T. S. (2015). An Inconvenient Truth: Arbitrary Distinctions Between Organizational, Mechanical Turk, and Other Convenience Samples. *Industrial and Organizational Psychology*, *8*(2), 142–164. https://doi.org/10.1017/iop.2015.13

Lange, J., Dalege, J., Borsboom, D., van Kleef, G. A., & Fischer, A. H. (2020). Toward an Integrative Psychometric Model of Emotions. *Perspectives on Psychological Science*, *15*(2), 444–468. https://doi.org/10.1177/1745691619895057

Lang, P. J., & Davis, M. (2006). *Emotion, motivation, and the brain: Reflex foundations in animal and human research* (pp. 3–29). https://doi.org/10.1016/S0079-6123(06)56001-7

Larsen, J. T., & McGraw, A. P. (2011). Further evidence for mixed emotions. *Journal of Personality and Social Psychology*, *100*(6), 1095–1110. https://doi.org/10.1037/a0021846

Larsen, R. J. (2000). Toward a Science of Mood Regulation. *Psychological Inquiry*, *11*(3), 129–141. https://doi.org/10.1207/S15327965PLI1103_01

Latinjak, A. T., Hatzigeorgiadis, A., & Zourbanos, N. (2017). Goal-Directed and Spontaneous Self-Talk in Anger- and Anxiety-Eliciting Sport-Situations. *Journal of Applied Sport Psychology*, *29*(2), 150–166. https://doi.org/10.1080/10413200.2016.1213330

Latinjak, A. T., Zourbanos, N., López-Ros, V., & Hatzigeorgiadis, A. (2014). Goal-directed and undirected self-talk: Exploring a new perspective for the study of athletes' self-talk. *Psychology of Sport and Exercise*, *15*(5), 548–558. https://doi.org/10.1016/j.psychsport.2014.05.007

Leary, M. R., & Baumeister, R. F. (2000). *The nature and function of self-esteem: Sociometer theory* (pp. 1–62). https://doi.org/10.1016/S0065-2601(00)80003-9

LeBlanc, S. (2013). *An Emotion Regulation Training Programme Focused on the Improvement of Mental Wellbeing through an Increase in Cognitive Reappraisal* [University of Roehampton]. https://pure.roehampton.ac.uk/ws/portalfiles/portal/431666/Sara_LeBlanc_THESIS_final.pdf

LeDoux, J. E., & Brown, R. (2017). A higher-order theory of emotional consciousness. *Proceedings of the National Academy of Sciences*, *114*(10), E2016–E2025. https://doi.org/10.1073/pnas.1619316114

Lee, Y.-C., & Wu, W.-L. (2015). Effects of Medical Disputes on Internet Communications of Negative Emotions and Negative Online Word-of-Mouth. *Psychological Reports*, *117*(1), 251–270. https://doi.org/10.2466/21.PR0.117c13z1

Lefebvre, H., & Levich, C. (1987). The Everyday and Everydayness. *Yale French Studies*, *73*, 7. https://doi.org/10.2307/2930193

Lefkowich, M. (2019). When Women Study Men: Gendered Implications for Qualitative Research. *International Journal of Qualitative Methods*, *18*, 160940691987238. https://doi.org/10.1177/1609406919872388

Levenson, R. W. (2011). Basic Emotion Questions. *Emotion Review*, *3*(4), 379–386. https://doi.org/10.1177/1754073911410743

Levenson, R. W., Carstensen, L. L., Friesen, W. v., & Ekman, P. (1991). Emotion, physiology, and expression in old age. *Psychology and Aging*, *6*(1), 28–35. https://doi.org/10.1037/0882-7974.6.1.28

Levenson, R. W., Ekman, P., & Friesen, W. v. (1990). Voluntary Facial Action Generates Emotion-Specific Autonomic Nervous System Activity. *Psychophysiology*, *27*(4), 363–384. https://doi.org/10.1111/j.1469-8986.1990.tb02330.x

Levin, C. J., Wai, J. M., Jones, J. D., & Comer, S. D. (2019). Changes in cardiac vagal tone as measured by heart rate variability during naloxone-induced opioid withdrawal. *Drug and Alcohol Dependence*, *204*, 107538. https://doi.org/10.1016/j.drugalcdep.2019.06.040

Levitzky, M. G. (2018). *Pulmonary physiology* (9th ed.). McGraw-Hill Education.

Lieberman, M. D., Inagaki, T. K., Tabibnia, G., & Crockett, M. J. (2011). Subjective responses to emotional stimuli during labeling, reappraisal, and distraction. *Emotion*, *11*(3), 468–480. https://doi.org/10.1037/a0023503

Lindquist, K. A. (2013). Emotions Emerge from More Basic Psychological Ingredients: A Modern Psychological Constructionist Model. *Emotion Review*, *5*(4), 356–368. https://doi.org/10.1177/1754073913489750

Lindquist, K. A., & Barrett, L. F. (2008). Constructing Emotion: The Experience of Fear as a Conceptual Act. *Psychological Science*, *19*(9), 898–903. https://doi.org/10.1111/j.1467-9280.2008.02174.x

Lindquist, K. A., & Gendron, M. (2013). What's in a Word? Language Constructs Emotion Perception. *Emotion Review*, *5*(1), 66–71. https://doi.org/10.1177/1754073912451351

Lindquist, K. A., MacCormack, J. K., & Shablack, H. (2015). The role of language in emotion: predictions from psychological constructionism. *Frontiers in Psychology*, *6*. https://doi.org/10.3389/fpsyg.2015.00444

Livingstone, K. M., & Isaacowitz, D. M. (2021). Age and emotion regulation in daily life: Frequency, strategies, tactics, and effectiveness. *Emotion*, *21*(1), 39–51. https://doi.org/10.1037/emo0000672

Loiselle, C. G., & Cossette, S. (2001). Cross-Cultural Validation of the Toronto Alexithymia Scale (TAS-20) in U.S. and Peruvian Populations. *Transcultural Psychiatry*, *38*(3), 348–362. https://doi.org/10.1177/136346150103800305

Lorde, A. (1997). The Uses of Anger. *Women's Studies Quarterly* , *25*(1/2), 278–285.

Loyka, C. M., Ruscio, J., Edelblum, A. B., Hatch, L., Wetreich, B., & Zabel, A. (2020). Weighing People Rather Than Food: A Framework for Examining External Validity. *Perspectives on Psychological Science*, *15*(2), 483–496. https://doi.org/10.1177/1745691619876279

Ludwig, L., Mehl, S., Krkovic, K., & Lincoln, T. M. (2020). Effectiveness of emotion regulation in daily life in individuals with psychosis and nonclinical controls—An experience-sampling study. *Journal of Abnormal Psychology*, *129*(4), 408–421. https://doi.org/10.1037/abn0000505

MacCallum, R. C., Widaman, K. F., Preacher, K. J., & Hong, S. (2001). Sample Size in Factor Analysis: The Role of Model Error. *Multivariate Behavioral Research*, *36*(4), 611–637. https://doi.org/10.1207/S15327906MBR3604_06

MacCormack, J. K., & Muscatell, K. A. (2019). The metabolic mind: A role for leptin and ghrelin in affect and social cognition. *Social and Personality Psychology Compass*, *13*(9). https://doi.org/10.1111/spc3.12496

MacDonald, G., & Leary, M. R. (2005). Why Does Social Exclusion Hurt? The Relationship Between Social and Physical Pain. *Psychological Bulletin*, *131*(2), 202–223. https://doi.org/10.1037/0033-2909.131.2.202

MacGeorge, E. L., Graves, A. R., Feng, B., Gillihan, S. J., & Burleson, B. R. (2004). The Myth of Gender Cultures: Similarities Outweigh Differences in Men's and Women's Provision of and Responses to Supportive Communication. *Sex Roles*, *50*(3/4), 143–175. https://doi.org/10.1023/B:SERS.0000015549.88984.8d

Maier, M., & Lakens, D. (2022). Justify Your Alpha: A Primer on Two Practical Approaches. *Advances in Methods and Practices in Psychological Science*, *5*(2), 251524592210803. https://doi.org/10.1177/25152459221080396

Malik, M. (1996). Heart Rate Variability. *Annals of Noninvasive Electrocardiology*, *1*(2), 151–181. https://doi.org/10.1111/j.1542-474X.1996.tb00275.x

Malik, M., & Camm, A. J. (1990). Heart rate variability. *Clinical Cardiology*, *13*(8), 570–576. https://doi.org/10.1002/clc.4960130811

Malmberg, J., Haataja, E., Seppänen, T., & Järvelä, S. (2019). Are we together or not? The temporal interplay of monitoring, physiological arousal and physiological synchrony during a collaborative exam. *International Journal of Computer-Supported Collaborative Learning*, *14*(4), 467–490. https://doi.org/10.1007/s11412-019-09311-4

Malooly, A. M., Flannery, K. M., & Ohannessian, C. M. (2017). Coping mediates the association between gender and depressive symptomatology in adolescence. *International Journal of Behavioral Development*, *41*(2), 185–197. https://doi.org/10.1177/0165025415616202

Mandel, B. B., Malhotra, H., Reagan, E., Hoemann, K., & Barrett, L. F. (2018). 'Untranslatable' Emotion Words are Dynamically Integrated into the Conceptual System. . *Research, Innovation and Scholarship Expo, Northeastern University*.

Mansell, W., Barnes, A., Grant, L., & de Sousa, L. M. (2022). Do meta-emotion strategies and their effects vary in students between their family home and their university home? *Current Psychology*, *41*(7), 4920–4930. https://doi.org/10.1007/s12144-020-00996-7

Markett, S., Wudarczyk, O. A., Biswal, B. B., Jawinski, P., & Montag, C. (2018). Affective Network Neuroscience. *Frontiers in Neuroscience*, *12*. https://doi.org/10.3389/fnins.2018.00895

Martel, F. L., Nevison, C. M., Simpson, M. J. A., & Keverne, E. B. (1995). Effects of opioid receptor blockade on the social behavior of rhesus monkeys living in large family groups. *Developmental Psychobiology*, *28*(2), 71–84. https://doi.org/10.1002/dev.420280202

Mascolo, M. F. (2009). Wittgenstein and the discursive analysis of emotion. *New Ideas in Psychology*, *27*(2), 258–274. https://doi.org/10.1016/j.newideapsych.2008.04.004

Mauss, I. B., & Robinson, M. D. (2009). Measures of emotion: A review. *Cognition & Emotion*, *23*(2), 209–237. https://doi.org/10.1080/02699930802204677

Mayer, J. D., & Cavallaro, R. (2019). *Brief mood introspection scale (BMIS): Technical and scoring manual*.

Mayer, J. D., & Gaschke, Y. N. (1988). The experience and meta-experience of mood. *Journal of Personality and Social Psychology*, *55*, 102–111.

McCall, C., & Singer, T. (2012). The animal and human neuroendocrinology of social cognition, motivation and behavior. *Nature Neuroscience*, *15*(5), 681–688. https://doi.org/10.1038/nn.3084

Mccraty, R., & Shaffer, F. (2015). Heart Rate Variability: New Perspectives on Physiological Mechanisms, Assessment of Self-regulatory Capacity, and Health Risk. *Global Advances in Health and Medicine*, *4*(1), 46–61. https://doi.org/10.7453/gahmj.2014.073

McGartland Rubio, D., Berg-Weger, M., & Tebb, S. S. (2001). Using Structural Equation Modeling to Test for Multidimensionality. *Structural Equation Modeling: A Multidisciplinary Journal*, *8*(4), 613–626. https://doi.org/10.1207/S15328007SEM0804_06

McKeown, G. J., & Sneddon, I. (2014). Modeling continuous self-report measures of perceived emotion using generalized additive mixed models. *Psychological Methods*, *19*(1), 155–174. https://doi.org/10.1037/a0034282

McKimmie, T., & Szurmak, J. (2002). Beyond Grey Literature: How Grey Questions Can Drive Research. *Journal of Agricultural & Food Information*, *4*(2), 71–79. https://doi.org/10.1300/J108v04n02_06

McRae, K., & Gross, J. J. (2020). Emotion regulation. *Emotion*, *20*(1), 1–9. https://doi.org/10.1037/emo0000703

Meeren, H. K. M., van Heijnsbergen, C. C. R. J., & de Gelder, B. (2005). Rapid perceptual integration of facial expression and emotional body language. *Proceedings of the National Academy of Sciences*, *102*(45), 16518–16523. https://doi.org/10.1073/pnas.0507650102

Mikulak, A. (2011). Mismatches between 'Scientific' and 'Non-Scientific' Ways of Knowing and Their Contributions to Public Understanding of Science. *Integrative Psychological and Behavioral Science*, *45*(2), 201–215. https://doi.org/10.1007/s12124-011-9157-8

Milyavsky, M., Webber, D., Fernandez, J. R., Kruglanski, A. W., Goldenberg, A., Suri, G., & Gross, J. J. (2019). To reappraise or not to reappraise? Emotion regulation choice and cognitive energetics. *Emotion*, *19*(6), 964–981. https://doi.org/10.1037/emo0000498

Minaee, S., Minaei, M., & Abdolrashidi, A. (2021). Deep-Emotion: Facial Expression Recognition Using Attentional Convolutional Network. *Sensors*, *21*(9), 3046. https://doi.org/10.3390/s21093046

Moors, A. (2017). Integration of Two Skeptical Emotion Theories: Dimensional Appraisal Theory and Russell's Psychological Construction Theory. *Psychological Inquiry*, *28*(1), 1–19. https://doi.org/10.1080/1047840X.2017.1235900

Moors, A., & Fischer, M. (2019). Demystifying the role of emotion in behaviour: toward a goal-directed account. *Cognition and Emotion*, *33*(1), 94–100. https://doi.org/10.1080/02699931.2018.1510381

Moran, E. K., Culbreth, A. J., & Barch, D. M. (2018). Emotion Regulation Predicts Everyday Emotion Experience and Social Function in Schizophrenia. *Clinical Psychological Science*, *6*(2), 271–279. https://doi.org/10.1177/2167702617738827

Mould, D., & Upton, R. (2012). Basic Concepts in Population Modeling, Simulation, and Model-Based Drug Development. *CPT: Pharmacometrics & Systems Pharmacology*, *1*(9), 6. https://doi.org/10.1038/psp.2012.4

Myin-Germeys, I., Oorschot, M., Collip, D., Lataster, J., Delespaul, P., & van Os, J. (2009). Experience sampling research in psychopathology: opening the black box of daily life. *Psychological Medicine*, *39*(9), 1533–1547. https://doi.org/10.1017/S0033291708004947

Nezlek, J. B., Wesselmann, E. D., Wheeler, L., & Williams, K. D. (2012). Ostracism in everyday life. *Group Dynamics: Theory, Research, and Practice*, *16*(2), 91–104. https://doi.org/10.1037/a0028029

Nezlek, J. B., Wesselmann, E. D., Wheeler, L., & Williams, K. D. (2015). Ostracism in Everyday Life: The Effects of Ostracism on Those Who Ostracize. *The Journal of Social Psychology*, *155*(5), 432–451. https://doi.org/10.1080/00224545.2015.1062351

Nightingale, A. J. (2020). *Triangulation. International Encyclopedia of Human Geography, 477–480*.

Nils, F., & Rimé, B. (2012). Beyond the myth of venting: Social sharing modes determine the benefits of emotional disclosure. *European Journal of Social Psychology*, *42*(6), 672–681. https://doi.org/10.1002/ejsp.1880

Nolen-Hoeksema, S. (2004). The response styles theory. *Depressive Rumination*, 107–124.

Nook, E. (2021). *Linguistic Distancing and Emotion Regulation: Theoretical, Developmental, and Translational Perspectives*. Harvard University.

Nook, E. C., Hull, T. D., Nock, M. K., & Somerville, L. H. (2022). Linguistic measures of psychological distance track symptom levels and treatment outcomes in a large set of psychotherapy transcripts. *Proceedings of the National Academy of Sciences*, *119*(13). https://doi.org/10.1073/pnas.2114737119

Nook, E. C., Sasse, S. F., Lambert, H. K., McLaughlin, K. A., & Somerville, L. H. (2017). Increasing verbal knowledge mediates development of multidimensional emotion representations. *Nature Human Behaviour*, *1*(12), 881–889. https://doi.org/10.1038/s41562-017-0238-7

Nook, E. C., Satpute, A. B., & Ochsner, K. N. (2021). Emotion Naming Impedes Both Cognitive Reappraisal and Mindful Acceptance Strategies of Emotion Regulation. *Affective Science*, *2*(2), 187–198. https://doi.org/10.1007/s42761-021-00036-y

Nook, E. C., Schleider, J. L., & Somerville, L. H. (2017). A linguistic signature of psychological distancing in emotion regulation. *Journal of Experimental Psychology: General*, *146*(3), 337–346. https://doi.org/10.1037/xge0000263

Nook, E. C., & Somerville, L. H. (2019). *Emotion Concept Development from Childhood to Adulthood* (pp. 11–41). https://doi.org/10.1007/978-3-030-27473-3_2

Nummenmaa, L., & Saarimäki, H. (2019). Emotions as discrete patterns of systemic activity. *Neuroscience Letters*, *693*, 3–8. https://doi.org/10.1016/j.neulet.2017.07.012

Nunan, D., Sandercock, G. R. H., & Brodie, D. A. (2010). A Quantitative Systematic Review of Normal Values for Short-Term Heart Rate Variability in Healthy Adults. *Pacing and Clinical Electrophysiology*, *33*(11), 1407–1417. https://doi.org/10.1111/j.1540-8159.2010.02841.x

Oates, J., Carpenter, D., Fisher, M., Goodson, S., Hannah, B., Kwiatowski, R., Prutton, K., Reeves, D., & Wainwright, T. (2021). *BPS Code of Human Research Ethics.* British Psychological Society.

Ochieng, P. A. (2009). An analysis of the strengths and limitation of qualitative and quantitative research paradigms. *Problems of Education in the 21st Century*, *13*, 13.

Ochsner, K. N., & Gross, J. J. (2008). Cognitive Emotion Regulation. *Current Directions in Psychological Science*, *17*(2), 153–158. https://doi.org/10.1111/j.1467-8721.2008.00566.x

Ohira, H. (2020). Predictive Processing of Interoception, Decision-Making, and Allostasis. *Psihologijske Teme*, *29*(1), 1–16. https://doi.org/10.31820/pt.29.1.1

Öhman, A., Flykt, A., & Esteves, F. (2001). Emotion drives attention: Detecting the snake in the grass. *Journal of Experimental Psychology: General*, *130*(3), 466–478. https://doi.org/10.1037/0096-3445.130.3.466

Öhman, A., Hamm, A., & Hugdahl, K. (2000). Cognition and the autonomic nervous system: Orienting, anticipation, and conditioning. In *Handbook of psychophysiology, 2nd ed.* (pp. 533–575). Cambridge University Press.

Oliver, E. J., Markland, D., Hardy, J., & Petherick, C. M. (2008). The effects of autonomy-supportive versus controlling environments on self-talk. *Motivation and Emotion*, *32*(3), 200–212. https://doi.org/10.1007/s11031-008-9097-x

Olshansky, B., Sabbah, H. N., Hauptman, P. J., & Colucci, W. S. (2008). Parasympathetic Nervous System and Heart Failure. *Circulation*, *118*(8), 863–871. https://doi.org/10.1161/CIRCULATIONAHA.107.760405

Oosterwijk, S., & Barrett, L. F. (2014). Embodiment in the Construction of Emotion Experience and Emotion Understanding. In *The Routledge Handbook of Embodied Cognition* (pp. 250–260). Routledge. https://doi.org/10.4324/9781315775845.ch24

Orgeta, V., & Orrell, M. (2014). Coping Styles for Anxiety and Depressive Symptoms in Community-Dwelling Older Adults. *Clinical Gerontologist*, *37*(4), 406–417. https://doi.org/10.1080/07317115.2014.907590

Ortony, A., & Turner, T. J. (1990). What's basic about basic emotions? *Psychological Review*, *97*(3), 315–331. https://doi.org/10.1037/0033-295X.97.3.315

Orvell, A., Kross, E., & Gelman, S. A. (2020). "You" speaks to me: Effects of generic-you in creating resonance between people and ideas. *Proceedings of the National Academy of Sciences*, *117*(49), 31038–31045. https://doi.org/10.1073/pnas.2010939117

Osin, E. N. (2012). Izmerenie pozitivnykh i negativnykh emotsii: razrabotka russkoyazychnogo analoga metodiki PANAS [Measuring Positive and Negative Affect: Development of a Russian-language Analogue of PANAS]. *Psychology. Journal of Higher School of Economics*, *9*(4), 91–110.

Pandey, R., & Srivastava, N. (2008). Psychometric evaluation of a hindi version of positive-negative affect schedule. *Industial Psychiatry Journal*, *17*(1), 49–54.

Panksepp, J. (1998). The periconscious substrates of consciousness: affective states and the evolutionary origins of the self . *Journal of Consciousness Studies*, *5*(5–6), 566–582.

Panksepp, J. (2004). *Affective neuroscience: The foundations of human and animal emotions*. Oxford university press.

Panksepp, J. (2005). Affective consciousness: Core emotional feelings in animals and humans. *Consciousness and Cognition*, *14*(1), 30–80. https://doi.org/10.1016/j.concog.2004.10.004

Panksepp, J. (2007). Neurologizing the Psychology of Affects: How Appraisal-Based Constructivism and Basic Emotion Theory Can Coexist. *Perspectives on Psychological Science*, *2*(3), 281–296. https://doi.org/10.1111/j.1745-6916.2007.00045.x

Panksepp, J. (2008). The affective brain and core consciousness: How does neural activity generate emotional feelings? In *Handbook of emotions, 3rd ed.* (pp. 47–67). The Guilford Press.

Panksepp, J. (2010). Affective neuroscience of the emotional BrainMind: evolutionary perspectives and implications for understanding depression. *Dialogues in Clinical Neuroscience*, *12*(4), 533–545. https://doi.org/10.31887/DCNS.2010.12.4/jpanksepp

Panksepp, J. (2011). The basic emotional circuits of mammalian brains: Do animals have affective lives? *Neuroscience & Biobehavioral Reviews*, *35*(9), 1791–1804. https://doi.org/10.1016/j.neubiorev.2011.08.003

Panksepp, J., & Bishop, P. (1981). An autoradiographic map of (3H) diprenorphine binding in rat brain: Effects of social interaction. *Brain Research Bulletin*, *7*(4), 405–410. https://doi.org/10.1016/0361-9230(81)90038-1

Panksepp, J., Clarici, A., Vandekerckhove, M., & Yovell, Y. (2019). Neuro-Evolutionary Foundations of Infant Minds: From Psychoanalytic Visions of How Primal Emotions Guide Constructions of Human Minds toward Affective Neuroscientific Understanding of Emotions and Their Disorders. *Psychoanalytic Inquiry*, *39*(1), 36–51. https://doi.org/10.1080/07351690.2019.1549910

Panksepp, J., Herman, B., Conner, R., Bishop, P., & Scott, J. P. (1978). The biology of social attachments: Opiates alleviate separation distress. *Biological Psychiatry*, *13*(5), 607–618.

Panksepp, J., Herman, B. H., Vilberg, T., Bishop, P., & DeEskinazi, F. G. (1980). Endogenous opioids and social behavior. *Neuroscience & Biobehavioral Reviews*, *4*(4), 473–487. https://doi.org/10.1016/0149-7634(80)90036-6

Panksepp, J., Knutson, B., & Pruitt, D. L. (1998). Toward a Neuroscience of Emotion. In *What Develops in Emotional Development?* (pp. 53–84). Springer US. https://doi.org/10.1007/978-1-4899-1939-7_3

Parkinson, B. (1996). Emotions are social. *British Journal of Psychology*, *87*(4), 663–683. https://doi.org/10.1111/j.2044-8295.1996.tb02615.x

Parkinson, B., Totterdell, P., Briner, R. B., & Reynolds, S. (1996). *Changing moods: The psychology of mood and mood regulation*. Longman London.

Parlamis, J. D. (2012). Venting as emotion regulation: The influence of venting responses and respondent identity on anger and emotional tone. *International Journal of Conflict Management*.

Parsons, S., Azevedo, F., Elsherif, M. M., Guay, S., Shahim, O. N., Govaart, G. H., Norris, E., O'Mahony, A., Parker, A. J., Todorovic, A., Pennington, C. R., Garcia-Pelegrin, E., Lazić, A., Robertson, O., Middleton, S. L., Valentini, B., McCuaig, J., Baker, B. J., Collins, E., … Aczel, B. (2022). A community-sourced glossary of open scholarship terms. *Nature Human Behaviour*, *6*(3), 312–318. https://doi.org/10.1038/s41562-021-01269-4

Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Sage Publications, Inc. .

Pelias, R. J. (2004). *A methodology of the heart: Evoking academic and daily life* (Vol. 15). Rowman Altamira.

Peltola, M. A. (2012). Role of editing of R–R intervals in the analysis of heart rate variability. *Frontiers in Physiology*, *3*. https://doi.org/10.3389/fphys.2012.00148

Pennebaker, J. W., & Chung, C. K. (2007). Expressive Writing, Emotional Upheavals, and Health. In H. S. Friedman & R. C. Silver (Eds.), *Foundations of health psychology* (pp. 263–284). Oxford University Press.

Petrocchi, N., & Cheli, S. (2019). The social brain and heart rate variability: Implications for psychotherapy. *Psychology and Psychotherapy: Theory, Research and Practice*, *92*(2), 208–223. https://doi.org/10.1111/papt.12224

Pham, T., Lau, Z. J., Chen, S. H. A., & Makowski, D. (2021). Heart Rate Variability in Psychology: A Review of HRV Indices and an Analysis Tutorial. *Sensors*, *21*(12), 3998. https://doi.org/10.3390/s21123998

Philipp, M. C., & Lombardo, L. (2017). Hurt feelings and four letter words: Swearing alleviates the pain of social distress. *European Journal of Social Psychology*, *47*(4), 517–523. https://doi.org/10.1002/ejsp.2264

Piaget, J. (1970). Genetic Epistemology. In *Genetic Epistemology*. Columbia University Press.

Piaget, J. (1973). *The child and reality: Problems of genetic psychology.(Trans. Arnold Rosin).* Grossman.

Piggot, J., & Stephens, R. (2017). *The Effect of Swearing on Feelings of Social Pain* [Bachelor's Degree in Psychology]. Keele University.

Polit, D. F., & Beck, C. T. (2010). Generalization in quantitative and qualitative research: Myths and strategies. *International Journal of Nursing Studies*, *47*(11), 1451–1458. https://doi.org/10.1016/j.ijnurstu.2010.06.004

Popper, K. (2014). *Conjectures and refutations: The growth of scientific knowledge*. routledge.

Porges, S. W. (1995). Cardiac vagal tone: A physiological index of stress. *Neuroscience & Biobehavioral Reviews*, *19*(2), 225–233. https://doi.org/10.1016/0149-7634(94)00066-A

Porges, S. W. (2003). The Polyvagal Theory: phylogenetic contributions to social behavior. *Physiology & Behavior*, *79*(3), 503–513. https://doi.org/10.1016/S0031-9384(03)00156-2

Porges, S. W. (2007). The polyvagal perspective. *Biological Psychology*, *74*(2), 116–143. https://doi.org/10.1016/j.biopsycho.2006.06.009

Porges, S. W. (2018). Polyvagal Theory: A Primer. In S. W. Porges & D. Dana (Eds.), *Clinical Applications of the Polyvagal Theory: The Emergence of Polyvagal-Informed Therapies* (pp. 50–70). WW Norton.

Port, R. F. (2003). Meter and speech. *Journal of Phonetics*, *31*(3–4), 599–611. https://doi.org/10.1016/j.wocn.2003.08.001

Powell, R. A., & Single, H. M. (1996). Focus Groups. *International Journal for Quality in Health Care*, *8*(5), 499–504. https://doi.org/10.1093/intqhc/8.5.499

Prescott, J. (2017). Some considerations in the measurement of emotions in sensory and consumer research. *Food Quality and Preference*, *62*, 360–368. https://doi.org/10.1016/j.foodqual.2017.04.005

Press, W. H., & Dyson, F. J. (2012). Iterated Prisoner's Dilemma contains strategies that dominate any evolutionary opponent. *Proceedings of the National Academy of Sciences*, *109*(26), 10409–10413. https://doi.org/10.1073/pnas.1206569109

Primeau, L. A. (2003). Reflections on Self in Qualitative Research: Stories of Family. *The American Journal of Occupational Therapy*, *57*(1), 9–16. https://doi.org/10.5014/ajot.57.1.9

Quigley, K. S., Kanoski, S., Grill, W. M., Barrett, L. F., & Tsakiris, M. (2021). Functions of Interoception: From Energy Regulation to Experience of the Self. *Trends in Neurosciences*, *44*(1), 29–38. https://doi.org/10.1016/j.tins.2020.09.008

Quigley, K. S., Lindquist, K. A., & Barrett, L. F. (2014). Inducing and measuring emotion and affect: Tips, tricks, and secrets. . In H. T. Reis & M. Judd (Eds.), *Handbook of research methods in social and personality psychology* (pp. 220–252). Cambridge University Press. .

Quintana, D. S., & Heathers, J. A. J. (2014). Considerations in the assessment of heart rate variability in biobehavioral research. *Frontiers in Psychology*, *5*. https://doi.org/10.3389/fpsyg.2014.00805

Raghuraj, P., Ramakrishnan, A. G., Nagendra, H. R., & Telles, S. (1998). Effect of Two Selected Yogic Breathing Techniques on Heart Rate Variability. *Indian Journal of Physiology and Pharmacology*, *42*(4), 467–472.

Rassin, E., & Muris, P. (2005). Why do women swear? An exploration of reasons for and perceived efficacy of swearing in Dutch female students. *Personality and Individual Differences*, *38*(7), 1669–1674. https://doi.org/10.1016/j.paid.2004.09.022

Redlich, O. (2020). The Concept of Birthday: A Theoretical, Historical, and Social Overview, in Judaism and Other Cultures. *WThe Concept of Birthday: A Theoretical, Historical, and Social Overview, in Judaism and Other Cultures*, *14*(9), 791–801.

Reisenzein, R. (2019). Cognition and emotion: a plea for theory. *Cognition and Emotion*, *33*(1), 109–118. https://doi.org/10.1080/02699931.2019.1568968

Reis, S., Huxley, E., Eng Yong Feng, B., & Grenyer, B. F. S. (2021). Pathological Narcissism and Emotional Responses to Rejection: The Impact of Adult Attachment. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.679168

Reynard, A., Gevirtz, R., Berlow, R., Brown, M., & Boutelle, K. (2011). Heart Rate Variability as a Marker of Self-Regulation. *Applied Psychophysiology and Biofeedback*, *36*(3), 209–215. https://doi.org/10.1007/s10484-011-9162-1

Rhue, L. (2018). Racial Influence on Automated Perceptions of Emotions. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3281765

Riegel, M., Żurawski, Ł., Wierzba, M., Moslehi, A., Klocek, Ł., Horvat, M., Grabowska, A., Michałowski, J., Jednoróg, K., & Marchewka, A. (2016). Characterization of the Nencki Affective Picture System by discrete emotional categories (NAPS BE). *Behavior Research Methods*, *48*(2), 600–612. https://doi.org/10.3758/s13428-015-0620-1

Rimé, B., Mesquita, B., Boca, S., & Philippot, P. (1991a). Beyond the emotional event: Six studies on the social sharing of emotion. *Cognition & Emotion*, *5*(5–6), 435–465. https://doi.org/10.1080/02699939108411052

Rimé, B., Mesquita, B., Boca, S., & Philippot, P. (1991b). Beyond the emotional event: Six studies on the social sharing of emotion. *Cognition & Emotion*, *5*(5–6), 435–465. https://doi.org/10.1080/02699939108411052

Robertson, O., & Evans, M. S. (2020). Just how reliable is your internal reliability? An overview of Cronbach's alpha (α). *The Quarterly*, *23*, 23–27.

Robertson, O., Robinson, S. J., & Stephens, R. (2017). Swearing as a response to pain: A cross-cultural comparison of British and Japanese participants. *Scandinavian Journal of Pain*, *17*(1), 267–272. https://doi.org/10.1016/j.sjpain.2017.07.014

Robles, R., & Páez, F. (2003). Estudio sobre la traducción al español y las propiedades psicométricas de las escalas de afecto positivo y negativo (PANAS). *Salud Mental*, *26*(1), 69–75.

Robson, D. (2017, August 12). A new way to look at emotions – and how to master yours. *BBC Future*.

Rosen, P. J., Leaberry, K. D., Slaughter, K., Fogleman, N. D., Walerius, D. M., Loren, R. E. A., & Epstein, J. N. (2019). Managing Frustration for Children (MFC) Group Intervention for ADHD: An Open Trial of a Novel Group Intervention for Deficient Emotion Regulation. *Cognitive and Behavioral Practice*, *26*(3), 522–534. https://doi.org/10.1016/j.cbpra.2018.04.002

Rosseel, Y. (2012). lavaan: An R Package for Structural Equation Modeling. *Journal of Statistical Software*, *48*(2), 1–36. https://doi.org/10.18637/jss.v048.i02

Rothermund, K., & Koole, S. L. (2020). Rethinking emotion science. *Cognition and Emotion*, *34*(4), 628–632. https://doi.org/10.1080/02699931.2020.1775924

Russell, J. A. (1979). Affective space is bipolar. *Journal of Personality and Social Psychology*, *37*(3), 345–356. https://doi.org/10.1037/0022-3514.37.3.345

Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, *39*(6), 1161–1178. https://doi.org/10.1037/h0077714

Russell, J. A. (2017). Mixed Emotions Viewed from the Psychological Constructionist Perspective. *Emotion Review*, *9*(2), 111–117. https://doi.org/10.1177/1754073916639658

Russell, J. A., & Barrett, L. F. (1999). Core affect, prototypical emotional episodes, and other things called emotion: Dissecting the elephant. *Journal of Personality and Social Psychology*, *76*(5), 805–819. https://doi.org/10.1037/0022-3514.76.5.805

Russell, J. A., & Carroll, J. M. (1999). On the bipolarity of positive and negative affect. *Psychological Bulletin*, *125*(1), 3–30.

Russell, M. E. B., Scott, A. B., Boggero, I. A., & Carlson, C. R. (2017). Inclusion of a rest period in diaphragmatic breathing increases high frequency heart rate variability: Implications for behavioral therapy. *Psychophysiology*, *54*(3), 358–365. https://doi.org/10.1111/psyp.12791

Salminen, J. K., Saarijärvi, S., Äärelä, E., Toikka, T., & Kauhanen, J. (1999). Prevalence of alexithymia and its association with sociodemographic variables in the general population of finland. *Journal of Psychosomatic Research*, *46*(1), 75–82. https://doi.org/10.1016/S0022-3999(98)00053-1

Samur, D., Tops, M., Schlinkert, C., Quirin, M., Cuijpers, P., & Koole, S. L. (2013). Four decades of research on alexithymia: moving toward clinical applications. *Frontiers in Psychology*, *4*. https://doi.org/10.3389/fpsyg.2013.00861

Sandelowski, M. (1995). Sample size in qualitative research. *Research in Nursing & Health*, *18*(2), 179–183. https://doi.org/10.1002/nur.4770180211

Sato, A., & Yasuda, A. (2001). Development of the Japanese version of Positive and Negative Affect Schedule (PANAS) scales. *The Japanese Journal of Personality*, *9*(2), 138–139.

Satpute, A. B., Nook, E. C., & Cakar, M. E. (2020). The Role of Language in the Construction of Emotion and Memory. In *Neuroscience of Enduring Change* (pp. 56–88). Oxford University Press. https://doi.org/10.1093/oso/9780190881511.003.0004

Scarantino, A. (2005). *Explicating emotions*. University of Pittsburgh.

Scherer, K. R. (2009). The dynamic architecture of emotion: Evidence for the component process model. *Cognition & Emotion*, *23*(7), 1307–1351. https://doi.org/10.1080/02699930902928969

Scherer, K. R. (2019). Studying appraisal-driven emotion processes: taking stock and moving to the future. *Cognition and Emotion*, *33*(1), 31–40. https://doi.org/10.1080/02699931.2018.1510380

Scherer, K. R., & Moors, A. (2019). The Emotion Process: Event Appraisal and Component Differentiation. *Annual Review of Psychology*, *70*(1), 719–745. https://doi.org/10.1146/annurev-psych-122216-011854

Schmitt, N., & Kuljanin, G. (2008). Measurement invariance: Review of practice and implications. *Human Resource Management Review*, *18*(4), 210–222. https://doi.org/10.1016/j.hrmr.2008.03.003

Schumacker, R. E., & Lomax, R. G. (2004). *A BEGINNER'S GUIDE TO STRUCTURAL EQUATION MODELING* (2nd ed.). Lawrence Erlbaum Associates, Inc.

Schutz, A. (1964). *Collected papers II: Studies in social theory* (Vol. 15). Springer Science & Business Media.

Schutz, A. (1976). *Equality and the Meaning Structure of the Social World* (pp. 226–273). https://doi.org/10.1007/978-94-010-1340-6_11

Schwartz, S. (1994). The fallacy of the ecological fallacy: the potential misuse of a concept and the consequences. *American Journal of Public Health*, *84*(5), 819–824. https://doi.org/10.2105/AJPH.84.5.819

Sealed Envelope Ltd. (2017). *Simple randomisation service* (Available from: https://www.sealedenvelope.com/simple-randomiser/v1/).

Seeley, S. H., Garcia, E., & Mennin, D. S. (2015). Recent advances in laboratory assessment of emotion regulation. *Current Opinion in Psychology*, *3*, 58–63. https://doi.org/10.1016/j.copsyc.2015.02.009

Sellaro, R., de Gelder, B., Finisguerra, A., & Colzato, L. S. (2018). Transcutaneous vagus nerve stimulation (tVNS) enhances recognition of emotions in faces but not bodies. *Cortex*, *99*, 213–223. https://doi.org/10.1016/j.cortex.2017.11.007

Shaffer, F., & Combatalade, D. C. (2013). Don't Add or Miss a Beat: A Guide to Cleaner Heart Rate Variability Recordings. *Biofeedback*, *41*(3), 121–130. https://doi.org/10.5298/1081-5937-41.3.04

Shaffer, F., & Ginsberg, J. P. (2017). An Overview of Heart Rate Variability Metrics and Norms. *Frontiers in Public Health*, *5*. https://doi.org/10.3389/fpubh.2017.00258

Shaffer, F., McCraty, R., & Zerr, C. L. (2014). A healthy heart is not a metronome: an integrative review of the heart's anatomy and heart rate variability. *Frontiers in Psychology*, *5*. https://doi.org/10.3389/fpsyg.2014.01040

Shaver, P. R., & Mikulincer, M. (2014). Adult Attachment and Emotion Regulation. In J. J. Gross (Ed.), *Handbook of Emotion Regulation* (2nd ed., pp. 237–250). The Guildford Press.

Sheldon, K. M., Elliot, A. J., Kim, Y., & Kasser, T. (2001). What is satisfying about satisfying events? Testing 10 candidate psychological needs. *Journal of Personality and Social Psychology*, *80*(2), 325–339. https://doi.org/10.1037/0022-3514.80.2.325

Shenton, A. K. (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information*, *22*(2), 63–75. https://doi.org/10.3233/EFI-2004-22201

Sheppes, G. (2014). Emotion regulation choice: Theory and findings. In *Handbook of emotion regulation, 2nd ed.* (pp. 126–139). The Guilford Press.

Sheppes, G. (2020). *Transcending the "good & bad" and "here & now" in emotion regulation: Costs and benefits of strategies across regulatory stages* (pp. 185–236). https://doi.org/10.1016/bs.aesp.2019.09.003

Sheppes, G., & Gross, J. J. (2011). Is Timing Everything? Temporal Considerations in Emotion Regulation. *Personality and Social Psychology Review*, *15*(4), 319–331. https://doi.org/10.1177/1088868310395778

Sherry, D. F., & Schacter, D. L. (1987). The evolution of multiple memory systems. *Psychological Review*, *94*(4), 439–454. https://doi.org/10.1037/0033-295X.94.4.439

Siegel, E. H., Sands, M. K., van den Noortgate, W., Condon, P., Chang, Y., Dy, J., Quigley, K. S., & Barrett, L. F. (2018). Emotion fingerprints or emotion populations? A meta-analytic investigation of autonomic features of emotion categories. *Psychological Bulletin*, *144*(4), 343–393. https://doi.org/10.1037/bul0000128

Simmons, J. P., Nelson, L. D., & Simonsohn, U. (n.d.). False-positive psychology: Undisclosed flexibility in data collection and analysis allows presenting anything as significant. In *Methodological issues and strategies in clinical research (4th ed.).* (pp. 547–555). American Psychological Association. https://doi.org/10.1037/14805-033

Sleegers, W. W. A., Proulx, T., & van Beest, I. (2017). The social pain of Cyberball: Decreased pupillary reactivity to exclusion cues. *Journal of Experimental Social Psychology*, *69*, 187–200. https://doi.org/10.1016/j.jesp.2016.08.004

Snefjella, B., Lana, N., & Kuperman, V. (2020). How emotion is learned: Semantic learning of novel words in emotional contexts. *Journal of Memory and Language*, *115*, 104171. https://doi.org/10.1016/j.jml.2020.104171

Solomon, R. C., & Stone, L. D. (2002). On 'Positive' and 'Negative' Emotions. *Journal for the Theory of Social Behaviour*, *32*(4), 417–435. https://doi.org/10.1111/1468-5914.00196

Somerville, L. H., Jones, R. M., & Casey, B. J. (2010). A time of change: Behavioral and neural correlates of adolescent sensitivity to appetitive and aversive environmental cues. *Brain and Cognition*, *72*(1), 124–133. https://doi.org/10.1016/j.bandc.2009.07.003

Soto, C. J., John, O. P., Gosling, S. D., & Potter, J. (2011). Age differences in personality traits from 10 to 65: Big Five domains and facets in a large cross-sectional sample. *Journal of Personality and Social Psychology*, *100*(2), 330–348. https://doi.org/10.1037/a0021717

Souza Olegario, L., Estevéz, M., González-Mohino, A., Madruga, M. S., & Ventanas, S. (2021). Cross-cultural emotional response to food stimuli: Influence of consumption context. *Food Research International*, *142*, 110194. https://doi.org/10.1016/j.foodres.2021.110194

Sperelakis, N. (2000). *Heart physiology and pathophysiology*. Elsevier.

Spiegel, A., Rosin, H., Gudenkauf, A., Rogers, J., Keane, M., Shaw, Y., Wendel, A., Simonds, L., & Heuther, A. (2017). Emotions. In *Invisibilia*. NPR.

Spielberger, C. D. (2006). Cross-Cultural Assessment of Emotional States and Personality Traits. *European Psychologist*, *11*(4), 297–303. https://doi.org/10.1027/1016-9040.11.4.297

Stapleton, C. D. (1997). *Basic Concepts and Procedures of Confirmatory Factor Analysis*.

Stapleton, K. (2003). Gender and Swearing: A Community Practice. *Women and Language*, *26*(2), 22–23.

Stapleton, K. (2010). *Swearing: Vol. Interper. Pragmatics* (M. A. Locher & S. L. Graham, Eds.). DE GRUYTER MOUTON. https://doi.org/10.1515/9783110214338

Stephens, R., Atkins, J., & Kingston, A. (2009). Swearing as a response to pain. *NeuroReport*, *20*(12), 1056–1060. https://doi.org/10.1097/WNR.0b013e32832e64b1

Stephens, R., & Robertson, O. (2020). Swearing as a Response to Pain: Assessing Hypoalgesic Effects of Novel “Swear” Words. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.00723

Stephens, R., & Umland, C. (2011). Swearing as a Response to Pain—Effect of Daily Swearing Frequency. *The Journal of Pain*, *12*(12), 1274–1281. https://doi.org/10.1016/j.jpain.2011.09.004

Sterling, P. (2012). Allostasis: A model of predictive regulation. *Physiology & Behavior*, *106*(1), 5–15. https://doi.org/10.1016/j.physbeh.2011.06.004

Stevens, J. (1992). Applied multivariate statistics for the social sciences, 2nd ed. In *Applied multivariate statistics for the social sciences, 2nd ed.* Lawrence Erlbaum Associates, Inc.

Stratou, G., Hoegen, R., Lucas, G., & Gratch, J. (2015). Emotional signaling in a social dilemma: An automatic analysis. *2015 International Conference on Affective Computing and Intelligent Interaction (ACII)*, 180–186. https://doi.org/10.1109/ACII.2015.7344569

Stratou, G., van der Schalk, J., Hoegen, R., & Gratch, J. (2017). Refactoring facial expressions: An automatic analysis of natural occurring facial expressions in iterative social dilemma. *2017 Seventh International Conference on Affective Computing and Intelligent Interaction (ACII)*, 427–433. https://doi.org/10.1109/ACII.2017.8273635

Stroop, J. R. (1935). Studies of interference in serial verbal reactions. *Journal of Experimental Psychology*, *18*(6), 643–662. https://doi.org/10.1037/h0054651

Suri, G., Sheppes, G., Young, G., Abraham, D., McRae, K., & Gross, J. J. (2018). Emotion regulation choice: the role of environmental affordances. *Cognition and Emotion*, *32*(5), 963–971. https://doi.org/10.1080/02699931.2017.1371003

Tabachnick, B. G., & Fidell, L. S. (2007). Using multivariate statistics, 5th ed. In *Using multivariate statistics, 5th ed.* Allyn & Bacon/Pearson Education.

Taber, K. S. (2018). The Use of Cronbach’s Alpha When Developing and Reporting Research Instruments in Science Education. *Research in Science Education*, *48*(6), 1273–1296. https://doi.org/10.1007/s11165-016-9602-2

Tamir, M., Vishkin, A., & Gutentag, T. (2020). Emotion regulation is motivated. *Emotion*, *20*(1), 115–119. https://doi.org/10.1037/emo0000635

Tashakkori, A., & Creswell, J. W. (2007). Editorial: The New Era of Mixed Methods. *Journal of Mixed Methods Research*, *1*(1), 3–7. https://doi.org/10.1177/2345678906293042

Team, R. C. (2016). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. *Http://Www.R-Project.Org/*. https://cir.nii.ac.jp/crid/1574231874043578752

Teddlie, C., & Tashakkori, A. (n.d.). Overview of contemporary issues in mixed methods research. *Sage Handbook of Mixed Methods in Social and Behavioral Research*, *2*, 1–44.

Tengler, C. D., & Jablin, F. M. (1983). Effects of question type, orientation, and sequencing in the employment screening interview [1]. *Communication Monographs*, *50*(3), 245–263. https://doi.org/10.1080/03637758309390167

Thayer, J. F., Hansen, A. L., & Johnsen, B. H. (2010). The non-invasive assessment of autonomic influences on the heart using impedance cardiography and heart rate variability. In *Handbook of behavioral medicine* (pp. 723–740). Springer.

Thayer, J. F., & Lane, R. D. (2000). A model of neurovisceral integration in emotion regulation and dysregulation. *Journal of Affective Disorders*, *61*(3), 201–216. https://doi.org/10.1016/S0165-0327(00)00338-4

Thayer, J. F., Loerbroks, A., & Sternberg, E. M. (2011). Inflammation and cardiorespiratory control: The role of the vagus nerve. *Respiratory Physiology & Neurobiology*, *178*(3), 387–394. https://doi.org/10.1016/j.resp.2011.05.016

Thoits, P. A. (2011). Mechanisms Linking Social Ties and Support to Physical and Mental Health. *Journal of Health and Social Behavior*, *52*(2), 145–161. https://doi.org/10.1177/0022146510395592

Thomas, S. D., Hathaway, D. K., & Arheart, K. L. (1992). Face Validity. *Western Journal of Nursing Research*, *14*(1), 109–112. https://doi.org/10.1177/019394599201400111

Tinsley, H. E. A., & Tinsley, D. J. (1987). Uses of factor analysis in counseling psychology research. *Journal of Counseling Psychology*, *34*(4), 414–424. https://doi.org/10.1037/0022-0167.34.4.414

Tonnaer, F., Cima, M., & Arntz, A. (2020). Explosive Matters: Does Venting Anger Reduce or Increase Aggression? Differences in Anger Venting Effects in Violent Offenders. *Journal of Aggression, Maltreatment & Trauma*, *29*(5), 611–627. https://doi.org/10.1080/10926771.2019.1575303

Tooby, J., & Cosmides, L. (1990). The past explains the present: The past explains the present: Emotional adaptations and the structure of ancestral environments.

Ethology and Sociobiology, *11*(4–5), 375–424. https://doi.org/10.1016/0162-3095(90)90017-Z

Torre, J. B., & Lieberman, M. D. (2018). Putting Feelings Into Words: Affect Labeling as Implicit Emotion Regulation. *Emotion Review*, *10*(2), 116–124. https://doi.org/10.1177/1754073917742706

Tracy, J. L., & Randles, D. (2011). Four Models of Basic Emotions: A Review of Ekman and Cordaro, Izard, Levenson, and Panksepp and Watt. *Emotion Review*, *3*(4), 397–405. https://doi.org/10.1177/1754073911410747

Triposkiadis, F., Karayannis, G., Giamouzis, G., Skoularigis, J., Louridas, G., & Butler, J. (2009). The Sympathetic Nervous System in Heart Failure: Physiology, Pathophysiology, and Clinical Implications. *J Am Coll Cardiol*, *54*(19), 1747–1762.

Tronick, E. Z., & Cohn, J. F. (1989). Infant-Mother Face-to-Face Interaction: Age and Gender Differences in Coordination and the Occurrence of Miscoordination. *Child Development*, *60*(1), 85. https://doi.org/10.2307/1131074

Tsang, S., Royse, C., & Terkawi, A. (2017). Guidelines for developing, translating, and validating a questionnaire in perioperative and pain medicine. *Saudi Journal of Anaesthesia*, *11*(5), 80. https://doi.org/10.4103/sja.SJA_203_17

Urry, H. L., & Gross, J. J. (2010). Emotion Regulation in Older Age. *Current Directions in Psychological Science*, *19*(6), 352–357. https://doi.org/10.1177/0963721410388395

van Bergen, P., & Parsell, M. (2019). Comparing radical, social and psychological constructivism in Australian higher education: a psycho-philosophical perspective. *The Australian Educational Researcher*, *46*(1), 41–58. https://doi.org/10.1007/s13384-018-0285-8

van Berkum, J. J. . A., de Zubicaray, G., & Schiller, N. (2019). Language comprehension and emotion: where are the interfaces, and who cares? In *Oxford Handbook of Neurolinguistics* (pp. 736–766).

van Boven, L., White, K., & Huber, M. (2009). Immediacy bias in emotion perception: Current emotions seem more intense than previous emotions. *Journal of Experimental Psychology: General*, *138*(3), 368–382. https://doi.org/10.1037/a0016074

VANGELISTI, A. L., PENNEBAKER, J. W., BRODY, N., & GUINN, T. D. (2014). Reducing social pain: Sex differences in the impact of physical pain relievers. *Personal Relationships*, *21*(2), 349–363. https://doi.org/10.1111/pere.12036

van Heesch, D., & van Beest, I. (2014). *F*ck! That hurt!: The effect of swearing on pain perception.* [Bachelors Degree]. Tilburg University.

van Lange, P. A. M. (2013). What We Should Expect From Theories in Social Psychology. *Personality and Social Psychology Review*, *17*(1), 40–55. https://doi.org/10.1177/1088868312453088

Vannini, A., & Gladue, C. (2008). *Decolonised Methodologies in Cross-Cultural Research* (pp. 137–159). https://doi.org/10.1007/978-1-4020-8567-3_10

van Raalte, J. L., Vincent, A., & Brewer, B. W. (2016). Self-talk: Review and sport-specific model. *Psychology of Sport and Exercise*, *22*, 139–148. https://doi.org/10.1016/j.psychsport.2015.08.004

van Wijk, C. H., & Dalla Cia, V. (2016). '"Covert Coping"' in Extreme Environments: Insights from South African Submarines. *Journal of Human Performance in Extreme Environments*, *12*(2). https://doi.org/10.7771/2327-2937.1083

Vaswani, A., Khaw, H. J., El-Medany, A., & Dougherty, S. D. (2022). *Cardiology in a Heartbeat* (2nd ed.). Scion Publishing Limited.

Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the Qualitative-Quantitative Divide: Guidelines for Conducting Mixed Methods Research in Information Systems . *MIS Quarterly* , *37*(1), 21–54. https://doi.org/http://www.jstor.org/stable/43825936

Verduyn, P., Delaveau, P., Rotgé, J.-Y., Fossati, P., & van Mechelen, I. (2015). Determinants of Emotion Duration and Underlying Psychological and Neural Mechanisms. *Emotion Review*, *7*(4), 330–335. https://doi.org/10.1177/1754073915590618

Vine, V., Bernstein, E. E., & Nolen-Hoeksema, S. (2019). Less is more? Effects of exhaustive vs. minimal emotion labelling on emotion regulation strategy planning. *Cognition and Emotion*, *33*(4), 855–862. https://doi.org/10.1080/02699931.2018.1486286

Waller, B. M., Cray, J. J., & Burrows, A. M. (2008). Selection for universal facial emotion. *Emotion*, *8*(3), 435–439. https://doi.org/10.1037/1528-3542.8.3.435

Watson, D., & Clark, L. A. (1994). *The PANAS-X: Manual for the Positive and Negative Affect Schedule - Expanded Form*.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*(6), 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063

Watson, D., & Stanton, K. (2017). Emotion Blends and Mixed Emotions in the Hierarchical Structure of Affect. *Emotion Review*, *9*(2), 99–104. https://doi.org/10.1177/1754073916639659

Watson, D., & Vadiya, J. G. (2012). Mood Measurement: Current Status and Future Directions. In I. B. Weiner, J. A. Schinka, & W. F. Velicer (Eds.), *Handbook of*

Psychology, Research Methods in Psychology (2nd ed., pp. 369–394). John Wiley & Sons.

Watt-Smith, T. (2016). *The Book of Human Emotions: From Ambiguphobia to Umpty–154 Words from Around the World for How We Feel*. Little, Brown Spark.

Wierzbicka, A. (1995). Everyday Conceptions of Emotion: A Semantic Perspective. In *Everyday Conceptions of Emotion* (Vol. 81, pp. 17–47). Springer Netherlands. https://doi.org/10.1007/978-94-015-8484-5_2

Wilkinson, S., Deane, G., Nave, K., & Clark, A. (2019). Getting Warmer: Predictive Processing and the Nature of Emotion. In *The Value of Emotions for Knowledge* (pp. 101–119). Springer International Publishing. https://doi.org/10.1007/978-3-030-15667-1_5

Williams, D. P., Cash, C., Rankin, C., Bernardi, A., Koenig, J., & Thayer, J. F. (2015). Resting heart rate variability predicts self-reported difficulties in emotion regulation: a focus on different facets of emotion regulation. *Frontiers in Psychology*, *6*. https://doi.org/10.3389/fpsyg.2015.00261

Williams, J. R. (2008). The Declaration of Helsinki and public health. *Bulletin of the World Health Organization*, *86*, 650–652.

Williams, K. D. (2002). *Ostracism: The power of silence*. Guilford Press.

Williams, K. D. (2009). Ostracism: Effects of being excluded and ignored. *Advances in Experimental Social Psychology*, *41*, 275–314.

Williams, K. D., Cheung, C. K. T., & Choi, W. (2000). Cyberostracism: Effects of being ignored over the Internet. *Journal of Personality and Social Psychology*, *79*(5), 748–762.

Williams, K. D., & Jarvis, B. (2006). Cyberball: A program for use in research on interpersonal ostracism and acceptance. *Behavior Research Methods*, *38*(1), 174–180. https://doi.org/10.3758/BF03192765

Williams, K. D., & Sommer, K. L. (1997). Social Ostracism by Coworkers: Does Rejection Lead to Loafing or Compensation? *Personality and Social Psychology Bulletin*, *23*(7), 693–706. https://doi.org/10.1177/0146167297237003

Willig, C. (2008). A Phenomenological Investigation of the Experience of Taking Part in `Extreme Sports'. *Journal of Health Psychology*, *13*(5), 690–702. https://doi.org/10.1177/1359105307082459

Wilms, R., Lanwehr, R., & Kastenmüller, A. (2020). Emotion Regulation in Everyday Life: The Role of Goals and Situational Factors. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.00877

Wilson-Mendenhall, C. D., Barrett, L. F., Simmons, W. K., & Barsalou, L. W. (2011). Grounding emotion in situated conceptualization. *Neuropsychologia*, *49*(5), 1105–1127. https://doi.org/10.1016/j.neuropsychologia.2010.12.032

Winter, G. (2000). A comparative discussion of the notion of validity in qualitative and quantitative research. *The Qualitative Report*, *4*(3), 1–14.

Wittgenstein, L. (1953). *Philosophical investigations*. Basil Blackwell.

Wlodarczak, M., & Heldner, M. (2020). Breathing in Conversation. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.575566

Wong, D. L., Hockenberry-Eaton, M., Wilson, D., Winkelstein, M. L., & Schwartz, P. (1996). Wong-Baker faces pain rating scale. *Home Health Focus*, *2*(8), 62.

Wood, A., Lupyan, G., & Niedenthal, P. (2016). Why Do We Need Emotion Words in the First Place? Commentary on Lakoff (2015). *Emotion Review*, *8*(3), 274–275. https://doi.org/10.1177/1754073915595103

Yang, T., & Sun, J.-M. (2019). A Resource Depletion Spiral? A Moderated Mediation Model of Emotional Exhaustion and Venting at Work. *Journal of Organizational Psychology*, *19*(6).

Yvonne Feilzer, M. (2010). Doing Mixed Methods Research Pragmatically: Implications for the Rediscovery of Pragmatism as a Research Paradigm. *Journal of Mixed Methods Research*, *4*(1), 6–16. https://doi.org/10.1177/1558689809349691

Zachar, P. (2022). The Psychological Construction of Emotion – A Non-Essentialist Philosophy of Science. *Emotion Review*, *14*(1), 3–14. https://doi.org/10.1177/17540739211058715

Zadro, L., Boland, C., & Richardson, R. (2006). How long does it last? The persistence of the effects of ostracism in the socially anxious. *Journal of Experimental Social Psychology*, *42*(5), 692–697. https://doi.org/10.1016/j.jesp.2005.10.007

Zadro, L., Williams, K. D., & Richardson, R. (2004). How low can you go? Ostracism by a computer is sufficient to lower self-reported levels of belonging, control, self-esteem, and meaningful existence. *Journal of Experimental Social Psychology*, *40*(4), 560–567. https://doi.org/10.1016/j.jesp.2003.11.006

Zaki, J., & Williams, W. C. (2013). Interpersonal emotion regulation. *Emotion*, *13*(5), 803–810. https://doi.org/10.1037/a0033839

Zeelenberg, M. (2018). *Regret is a Basic Emotion* (Tilburg University & Vrije Universiteit Amsterdam).

Zhang, M., Zhang, Y., & Kong, Y. (2019). Interaction between social pain and physical pain. *Brain Science Advances*, *5*(4), 265–273. https://doi.org/10.26599/BSA.2019.9050023

Zimmermann, P., & Iwanski, A. (2014). Emotion regulation from early adolescence to emerging adulthood and middle adulthood. *International Journal of Behavioral Development*, *38*(2), 182–194. https://doi.org/10.1177/0165025413515405

Zuberi, T., & Bonilla-Silva, E. (2008). *White Logic, White Methods: Racism and Methodology*. Rowman & Littlefield Publishers.

Appendices

Appendix A – Study One Ethical Approval Letter

Keele University

Ref: ERP2317

1st March 2017

Olivia Robertson
DH1.23, School of Psychology
Keele University

Dear Olivia,

Re: A psychobiological investigation into the role of expressive speech as an emotion regulatory technique

Thank you for submitting your revised application for review. The revised proposal was reviewed at the Ethical Review Panel meeting on Thursday, 16th February 2017 and I am pleased to inform you that your application has been approved by the Ethics Review Panel.

The following documents have been reviewed and approved by the panel as follows:

Document	Version	Date
Information Sheet / Consent Form / Consent for the use of quotes	FGSS1CON2	February 2017
Focus Group Interview Guide	None	None
Semi-Structured Interview Guide	None	February 2017
Debrief Sheet	None	None

If the fieldwork goes beyond the date stated in your application, **30th November 2017**, or there are any other amendments to your study you must submit an 'application to amend study' form to the ERP administrator at research.governance@keele.ac.uk stating **ERP2** in the subject line of the e-mail. This form is available via http://www.keele.ac.uk/researchsupport/researchethics/

If you have any queries, please do not hesitate to contact me via the ERP administrator on research.governance@keele.ac.uk stating **ERP2** in the subject line of the e-mail.

Yours sincerely,

pp C H Bannerman

Dr Colin Rigby
Chair – Ethical Review Panel

CC Supervisor
RI Manager

Directorate of Engagement & Partnerships
T: +44(0)1782 734467

Keele University, Staffordshire ST5 5BG, UK
www.keele.ac.uk +44 (0)1782 732000

Appendix B – Study One Semi-Structured Interview Schedule

Semi-structured Interview Questions

- Introduction to interview (go through information and consent form again)
    - Express appreciation; e.g. “Thank you so much for coming.”
    - Reason for interview; e.g. “I’ve invited you here because I’d like to your opinion about emotions and speech and how those two things interact.”
    - Reason for interview; e.g. “I hope by the end I’d like to get a better understanding about how you use speech in your daily life to change your feelings.”
    - Determine duration of interview; e.g. “So if it’s okay with you I’m going to ask you some questions. It should only take an hour, if that’s alright?”
    - Increase confidence in answers; e.g. “You can tell me anything that comes to mind or whatever is your opinion. There’s never a wrong answer.”
    - Address confidentiality; e.g. “Everything you tell me will be confidential. That means that whatever you say or we discuss will just be between me and you. I am recording this session, but that’s only for me so that I can remember what we have been saying. It’s so I can go over it later and write up some notes. But everything you say is only me hearing it, and when the interview is written up everything will be anonymised. No one will ever know who said what. Is that alright?”
    - Address withdrawal from study; e.g. “If you want to stop at any time or take a break, that’s absolutely fine. Just let me know. If you decide that you don’t want to be part of the study and withdraw, you don’t have to give me a reason. Just tell me that you want to stop.”
    - Opportunity for participant to ask questions; e.g. “Do you have any questions so far for me?”
    - Start study; e.g. “Shall we start the interview then?”

- Question: Emotional Experiences
    - “Can you tell me, what does the phrase ‘emotional experience’ mean to you?”
        - Can you give me an example of an emotional experience that might happen in someone’s daily life?
        - What is an emotion? What is an experience? What makes an experience emotional? Does something bad have to happen? Can emotional experiences be good things?
        - Are all experiences emotional?
    - “When you think about your life recently, can you give me an example of an experience that was emotional for you? What made it emotional?”
        - What makes (context) an emotional experience? What feelings were going on for you then?

    - You mentioned (emotion), which is quite a (negative/positive) feeling. Can you talk to me about (positive/negative) emotional experiences?
    - Can you tell me more about that?

- Question: Vocalisation & Speech
  - "When you think about speech and vocalisations, what is it? What comes to mind?"
    - Is there a difference between vocalisations and speech? What is it?
    - Are there any other types of vocalisations/speech you might use on your own? What about in public? Does this change when you're with your family/friends?
    - Can you give me an example of when you might use (vocalisation)? Why would you use it?

- Question: How vocalising affects negative emotions
  - "What I'd like to ask you to do is to think back to a recent point in time that made you feel emotional in a negative way – maybe a specific experience or maybe a particular event. So a good example is something that happened to me the other day. I was at work and someone missed a deadline which was important to me, and I felt really frustrated with them. So afterwards I vented to my friends about it. Maybe if you take a minute or two to think about something that might have happened to you, and tell me about it?"
    - Can you tell me the story of the event? Maybe starting at the beginning all the way through to the end.
    - What kinds of feelings were going on for you then?
    - How did you vocalise it?
    - Do you think (vocalisation) helped you change your emotions? Why? How?
    - (If helpful) What about it was helpful? Do you think that how you said it or what you said was the most useful? Can you give me an example of how it changed things for you?
    - (If not helpful) What about it wasn't helpful? Are there other ways of vocalising that would be helpful in changing how you felt, do you think? Can you give me an example?
    - How did you feel after you (vocalisation)?
    - What do you mean by it made you feel better/worse?
    - (If not helpful) You mentioned that because of (context) it wasn't really a good thing to say at the time and maybe you would have (different vocalising). Do you think that vocalising emotions is a conscious action that we all do?
    - If you think about similar times which have made you feel this way, do you tend to vocally express (emotion) this way? Or does it sometimes

change? When/How does it change? What is it about the differences makes you change from (a) to (b)?

  - You mentioned there (other emotion), could you tell me a little more about that?
  - You said that after doing (vocalisation) you feel (emotion). What does that feel like? Can you tell me a little more about that?
  - You have talked about (emotion), what about (Anger/sadness/fear/disgust/embarrasment)? Can you tell me anything about (new target emotion)?
  - In that story/event/experience, you mentioned (social context/context). What was it about (vocalisation) in that (context) that changed the way you felt?
  - Can you tell me more about that?
  - You mention that (vocalisation) when you feel (emotion) happens it a (Social context/on own), what about if you were (on own/in public)?
  - What was more important: talking about feelings or facts in making you feel better?

- Question: How vocalising affects positive emotions
  - "So we just talked about (negative emotion/event). Can you think back to a recent time which made you feel positive? And tell me about it."

    - Can you tell me the story of the event? Maybe starting at the beginning all the way through to the end.
    - What kinds of feelings were going on for you then?
    - How did you vocalise it?
    - Do you think (vocalisation) helped you change your emotions? Why?
    - (If helpful) What about it was helpful? Can you give me an example of how it changed things for you?
    - (If not helpful) What about it wasn't helpful? Are there other ways of vocalising that would be helpful, do you think? Can you give me an example?
    - How did you feel after you (vocalisation)?
    - What do you mean by it made you feel better/worse?
    - (If not helpful) You mentioned that because of (context) it wasn't really a good thing to say at the time and maybe you would have (different vocalising). Do you think that vocalising emotions is a conscious action that we all do? What impacts upon which vocalisation is used?
    - If you think about similar times which have made you feel this way, do you tend to vocally express (emotion) this way? Or does it sometimes change? When/How does it change? What is it about the differences makes you change from (a) to (b)?
    - You mentioned there (other emotion), could you tell me a little more about that?

- You said that after doing (vocalisation) you feel (emotion). What does that feel like? Can you tell me a little more about that?
- In that story/event/experience, you mentioned (social context/context). What was it about (vocalisation) in that (context) that changed the way you felt?
- Can you tell me more about that?
- You mention that (vocalisation) when you feel (emotion) happens it a (Social context/on own), what about if you were (on own/in public)?
- You've talked about (emotion), can you tell me about an experience where you were (joyful/excited/relaxed/optimistic/satisfied)?
- Because you're talking about (positive emotion), do you think that (vocalisation) could make you feel (positive emotion) than you already did? Why?
- What was more important: talking about feelings or facts in making you feel better?

- Question: Thoughts about others' experiences
  - "As well as your experiences with speech and emotions, I was also wanting to ask you about how you thought the people close to you – maybe your friends or family – vocalised their emotions. Can you think of any ways that they might use their spoken language during or after an emotional experience, or can you think of ways someone has or might vocalise that someone close to you might do?"
    - How did they express that emotion? How did they vocalise it?
    - Do you think it helped them? Why? What do you mean by felt better/worse?
    - So you have described a scenario with (individual), what about (parent/friend/sibling/partner)? How do they vocalise during or after an emotional experience?
    - Can you tell me a little bit more about that?
    - Before you mentioned that there are (positive/negative) potential consequences to (vocalisation), do you think that affects (person) when they do it?
    - Can you give me an example of (person) experiencing an (opposite = positive/negative) emotion?

- Closing interview
  - Offer opportunity for further points; e.g. "Is there anything else you'd like to add?"
  - Express gratitude; e.g. "Thank you so much again for taking part in this interview with me."
  - Offer opportunity for questions; e.g. "That's really all the questions I have for you, but is there anything you'd like to ask me?"
  - Debrief; e.g. "As I mentioned before this interview is part of a study looking at how speech and emotion interact, and this interview is going to inform further

studies as part of a research project. I understand that you have thought about a lot of emotional experiences in the past hour so I'm going to give you the information of emotional support networks available to you – both at a university and national level – just in case you need them. And, of course, if you have any questions or queries after today, my information is on your consent form so please just shoot me or my supervisor an email."

Appendix C – Study One Focus Group Interview Schedule

Focus Group Interview Guide

- Introduction to focus group
    - Express appreciation; e.g. "Thank you all so much for coming."
    - Reason for interview; e.g. "I've invited you all here because I'd like to your opinion about emotions and speech and how those two things interact."
    - Reason for interview; e.g. "I hope by the end I'd like to get a better understanding about how you guys use speech in your daily life to change your feelings."
    - Determine duration of interview; e.g. "So today we're going to take part in a group discussion. It should only take an hour, if that's alright?"
    - Increase confidence in answers; e.g. "You can tell me anything that comes to mind or whatever is your opinion. There's never a wrong answer. Everyone's opinions are valid."
    - Address confidentiality; e.g. "Everything we discuss today is confidential. That means that what we say in the room stays in the room. I am recording this session, but that's only for me so that I can remember what we have been saying. It's so I can go over it later and write up some notes. But everything you guys say is only me hearing it, and when the discussion is written up everything will be anonymised. No one will ever know who said what. Is that alright?"
    - Address withdrawal from study; e.g. "If you want to stop at any time or take a break, that's absolutely fine. Just let me know. If you decide that you don't want to be part of the study and withdraw, you don't have to give me a reason. Just tell me that you want to stop or you can walk out, that's absolutely fine."
    - Opportunity for participant to ask questions; e.g. "Does anyone have any questions so far for me?"
    - Start study; e.g. "Shall we start the group then?"

- Question: Emotional Experiences
    - "What do you guys think is an emotional experience?"
        - Can you give me an example of an emotional experience?
        - What makes (context) an emotional experience?
        - What makes an experience emotional?

    - Can you give me an example of an emotional experience that might happen in someone's daily life?
    - What is an emotion? What is an experience? What makes an experience emotional? Does something bad have to happen? Can emotional experiences be good things?
    - Can you give me an example of an emotion?
    - Are emotions good? Are motions bad? What's the difference?
    - Are all experiences emotional?
  - "When you think about your life recently, can anyone give me an example of an experience that was emotional for you? What made it emotional?"
    - What makes (context) an emotional experience? What feelings were going on for you then?
    - So we have discussed (emotion), which is quite a (negative/positive) feeling. Can anyone give me an example of a (positive/negative) emotional experiences?
    - Can you tell me more about that?

- Question: Vocalisation & Speech
  - "When you think about speech and vocalisations, what is it? What comes to mind?"
    - Is there a difference between vocalisations and speech? What is it?
    - Are there any other types of vocalisations/speech you might use on your own? What about in public? Does this change when you're with your family/friends?
    - Does anyone else do the same thing? Or in (context) would you do something different?
    - Can you give me an example of when you might use (vocalisation)? Why would you use it?

- Question: How vocalising affects negative emotions
  - "What I'd like to ask you to do is to think back to a recent point in time that made you feel emotional in a negative way – maybe a specific experience or maybe a particular event. So a good example is something that happened to me the other day. I was at work and someone missed a deadline which was important to me, and I felt really frustrated with them. So afterwards I vented to my friends about it. Maybe if you take a minute or two to think about something that might have happened to you, and tell me about it?"
    - Can you tell me the story of the event? Maybe starting at the beginning all the way through to the end.
    - What kinds of feelings were going on for you then?
    - How did you vocalise it?
    - Do you think (vocalisation) helped you change your emotions? Why? How?

- (If helpful) What about it was helpful? Do you think that how you said it or what you said was the most useful? Can you give me an example of how it changed things for you?
- (If not helpful) What about it wasn't helpful? Are there other ways of vocalising that would be helpful in changing how you felt, do you think? Can you give me an example?
- What are other ways you could have used speech in that scenario?
- Does anyone else do the same thing? Or in (context) would you do something different?
- How did you feel after you (vocalisation)? Does anyone else feel the same after doing this?
- What do you mean by it made you feel better/worse?
- (If not helpful) You mentioned that because of (context) it wasn't really a good thing to say at the time and maybe you would have (different vocalising). Do you think that vocalising emotions is a conscious action that we all do? Can anyone give me an example?
- If you think about similar times which have made you feel this way, do you tend to vocally express (emotion) this way? Or does it sometimes change? When/How does it change? What is it about the differences makes you change from (a) to (b)?
- You mentioned there (other emotion), could you tell me a little more about that?
- You said that after doing (vocalisation) you feel (emotion). What does that feel like? Can you tell me a little more about that?
- We have talked about (emotion), what about (Anger/sadness/fear/disgust/embarrassment)? Can you anyone tell me anything about (new target emotion)?
- In that story/event/experience, you mentioned (social context/context). What was it about (vocalisation) in that (context) that changed the way you felt?
- Can you tell me more about that?
- You mention that (vocalisation) when you feel (emotion) happens it a (Social context/on own), what about if you were (on own/in public)?
- Is it more important to talk about your feelings or talk about the facts? Which makes you feel better?

- Question: How vocalising affects positive emotions
  - "So we just talked about (negative emotion/event). Can you think back to a recent time which made you feel positive? And tell me about it."

    - Can you tell me the story of the event? Maybe starting at the beginning all the way through to the end.
    - What kinds of feelings were going on for you then?
    - How did you vocalise it?
    - Do you think (vocalisation) helped you change your emotions? Why?
    - (If helpful) What about it was helpful? Can you give me an example of how it changed things for you?

- (If not helpful) What about it wasn't helpful? Are there other ways of vocalising that would be helpful, do you think? Can you give me an example?
- Does anyone else do the same thing? Or in (context) would you do something different?
- How did you feel after you (vocalisation)?
- What do you mean by it made you feel better/worse?
- (If not helpful) You mentioned that because of (context) it wasn't really a good thing to say at the time and maybe you would have (different vocalising). Do you think that vocalising emotions is a conscious action that we all do? What impacts upon which vocalisation is used?
- If you think about similar times which have made you feel this way, do you tend to vocally express (emotion) this way? Or does it sometimes change? When/How does it change? What is it about the differences makes you change from (a) to (b)?
- You mentioned there (other emotion), could you tell me a little more about that?
- You said that after doing (vocalisation) you feel (emotion). What does that feel like? Can you tell me a little more about that?
- In that story/event/experience, you mentioned (social context/context). What was it about (vocalisation) in that (context) that changed the way you felt?
- Can you tell me more about that?
- You mention that (vocalisation) when you feel (emotion) happens it a (Social context/on own), what about if you were (on own/in public)?
- We've talked about (emotion), can you tell me about an experience where you were (joyful/excited/relaxed/optimistic/satisfied)?
- Because you're talking about (positive emotion), do you think that (vocalisation) could make you feel (positive emotion) than you already did? Why?

- Question: Thoughts about others' experiences
  - "As well as your experiences with speech and emotions, I was also wanting to ask you about how you thought the people close to you – maybe your friends or family – vocalised their emotions. Can you think of any ways that they might use their spoken language during or after an emotional experience, or can you think of ways someone has or might vocalise that someone close to you might do?"
    - How did they express that emotion? How did they vocalise it?
    - Do you think it helped them? Why? What do you mean by felt better/worse?
    - So you have described a scenario with (individual), what about (parent/friend/sibling/partner)? How do they vocalise during or after an emotional experience?
    - Can you tell me a little bit more about that?

        - Does anyone else have any similar experiences? Can you tell me about it?
        - Why do you think they do that? Do you do it too?
        - Before you mentioned that there are (positive/negative) potential consequences to (vocalisation), do you think that affects (person) when they do it?
        - Can you give me an example of (person) experiencing an (opposite = positive/negative) emotion?

- Closing focus group
    - Offer opportunity for further points; e.g. "Is there anything else anyone would like to add?"
    - Express gratitude; e.g. "Thank you so much again for taking part in this discussion group
    - Offer opportunity for questions; e.g. "That's really all the questions I have for you, but is there anything you'd like to ask me?"
    - Debrief; e.g. "As I mentioned before this interview is part of a study looking at how speech and emotion interact, and this discussion is going to inform further studies as part of a research project. I understand that you have thought about a lot of emotional experiences in the past hour so I'm going to give you the information of emotional support networks available to you – both at a university and national level – just in case you need them. And, of course, if you have any questions or queries after today, my information is on your consent form so please just shoot me or my supervisor an email."

Appendix D – Study One Participant Information Sheet

INFORMATION SHEET

Study Title: A psychobiological investigation into the role of expressive speech as an emotion regulatory technique

Invitation
You are being invited to consider taking part in research studying what kinds of speech are used after everyday emotional experiences which shapes our feelings and physical experience of emotion. This project is being undertaken by Olly Robertson, Dr Richard Stephens, Dr Sammyh Khan, and Dr Alexandra Lamont.

Before you decide whether or not you wish to take part, it is important for you to understand why this research is being done and what it will involve. Please take time to read this information carefully and discuss it with friends and relatives if you wish. Ask us if there is anything that is unclear or if you would like more information.

Aims of the Research
The current research project aims to explain the circumstances in which emotional speech can be an effective way of shaping our emotions, how it works to change the way we feel, and to find out how effective it actually is in changing feelings following an everyday emotional experience.

Why have I been invited?
You have received this information sheet as you have requested further information about being part of some research investigating the ways you use speech in your everyday life to regulate your emotions. You may be invited to participate in one of two ways, either as part of an interview or as part of a discussion group. For the interviews a total of 15-20 participants will be recruited. However, your interview will happen on a one-to-one basis with a researcher. For the discussion group a total of 15-20 participants will be recruited. However, there will only be 5-7 participants in each group.

Do I have to take part?
You are free to decide whether you wish to take part or not. If you do decide to take part, you will be asked to sign a two forms provided to you by the research team. The first form indicates that the background of the research and how to withdraw from the study has been explained to you, and that you wish to take part in the discussion group. The second form indicates whether or not you are happy for quotes from the discussion group to be used as part of future studies or in potential future publications. You are free to withdraw from this study at any time and without giving reasons. If you withdraw from the interview, everything you have said and any recordings will be withdrawn from the study. If you withdraw during the focus group, as you have been part

of a group discussion, your data cannot be removed from the recording. However, what you have said during the group will not be used as part of the analysis. You will be unable to withdraw your data after either the discussion group or interview as each participant will be anonymised and it will be impossible to find your data.

What will happen if I take part?
As part of the focus group, you will be asked to take part in discussions about the topic of emotions, speech and how these two things interact. The things discussed in the discussion group and interviews are confidential, so it is important to respect your and other's privacy and not discuss them outside of the group. The discussion will be led by yourself, and if present any other participants in response to questions. The discussion group and interview will be recorded by an audio recorder; this is so that the researcher team can transcribe the discussion points accurately.

What are the benefits (if any) of taking part?
Participation in the study can count towards accredited time for either the School of Psychology Research Participation Scheme or Keele SU's volunteering awards.

What are the risks (if any) of taking part?
You may feel concerned about issues surrounding confidentiality. When the recordings from the discussion group and interviews are written up as a text transcript, you will be assigned a random number, which will protect your identity, and will be stored alongside the transcript and audio recording. Your name will not be kept alongside any data collected. It will only feature on the consent form, which will not be saved with any other data recorded as part of this project. Your consent form will be kept in a locked filing cabinet on university property to which only the principal investigator, Olly Robertson, has access to. Transcripts and audio recordings will be stored on a password protected external hard drive, which only the principal investigator will be able to access. All data will be retained by the principal investigator for five years, after which it will be securely disposed of.

How will information about me be used?
Your data is being collected to inform the contexts and strategies used in future studies investigating how effective speech is in regulating emotions in everyday scenarios. The data from the discussion group and interviews may also be analysed and written up as a research paper.

Who will have access to information about me?

Only the research team will have access to the data collected as part of the study. Each participant will be assigned a randomised research ID which will be stored alongside their transcript. The data will not contain any information which may identify you. All discussion points in the focus group and all aspects of the interview will be treated as confidential. The research team do however have to work within the confines of current legislation over such matters as privacy and confidentiality, data protection and human rights and so offers of confidentiality may sometimes be overridden by law. For example, in circumstances whereby there are concerns over any actual or potential harm to yourself or others the principal investigator must pass this information to the supervisory team attached to this research project.

Who is funding and organising the research?
Research is being conducted as part of a PhD research project in the school of psychology at Keele University and has been funded by the Keele University Faculty of Natural Sciences.

What if there is a problem?

If you have a concern about any aspect of this study, you may wish to speak to the researcher(s) who will do their best to answer your questions. You should contact Olly Robertson on O.M.Robertson@keele.ac.uk or 01782 734402. Alternatively, if you do not wish to contact the researcher you may contact Dr Richard Stephens on R.Stephens@keele.ac.uk.

If you remain unhappy about the research and/or wish to raise a complaint about any aspect of the way that you have been approached or treated during the course of the study, please write to Nicola Leighton who is the University's contact for complaints regarding research at the following address:

Nicola Leighton
Research Governance Officer
Directorate of Engagement and Partnerships
IC2 Building
Keele University
ST5 5NH
E-mail: n.leighton@ keele.ac.uk
Tel: 01782 733306

Appendix E – Study One Consent Forms

CONSENT FORM

Title of Project: A psychobiological investigation into the role of expressive speech as an emotion regulatory technique

Name and contact details of Principal Investigator: Olly Robertson, Room 1.23, Dorothy Hodgkin Building, Keele University, 01782 734402, O.M.Robertson@keele.ac.uk

Please initial box if you agree with the statement

1. I confirm that I have read and understood the information sheet for the above study and have had the opportunity to ask questions

2. I understand that my participation is voluntary and that I am free to withdraw at any time

3. I agree to take part in this study.

4. I agree to allow the dataset collected to be used for future research projects

Name of participant	Date	Signature

Researcher Date Signature

CONSENT FORM
(for use of quotes)

Title of Project: A psychobiological investigation into the role of expressive speech as an emotion regulatory technique

Name and contact details of Principal Investigator: Olly Robertson, Room 1.23, Dorothy Hodgkin Building, Keele University, 01782 734402, O.M.Robertson@keele.ac.uk

Please initial box if you agree with the statement

1. I agree for my quotes to be used ☐

2. I do not agree for my quotes to be used ☐

Name of participant Date Signature

Researcher	Date	Signature

Appendix F – Example of Coding Notes

emotions (whether due to circumstance or maladaption) in daily life.
May be due to our experience of negative events as more impactful and salient.
May be a reflection of reality
- Analysis driven by epistemology (contextualist)?

#2760 prefers to seek out social support from close conversational partner (Mum or Best friend) and uses them as an aid to contextualise distress + solicit solution to stressor as a means of regulation
↳ Example of co-regulation (bidirectional link of oscilating emotion channels leading to adaptive regulation)
↳ Choice of conversation partner chosen due to implicit belief that partner's views + ideas are important, and will benefit #2760

"There's definitely more than one type of Fear. But I think it's just one word. But there's different types of fear. There could be, you know, you're on a theme ride and you're all the way at the top + you're scared to come down. I think that's fear. And then you've got one fear, that you're scared of exams. Or a fear of spiders. They're all different types of fear, I think."

CONSTRUCTED EMOTION THEORY:

Example of inherent variation within emotion category. Mediated by situation appraisal, prediction of future, + internal experiences.
↳ ie rollercoaster fun + short, exams have long repercussions, spiders are harmful

BASIC EMOTION THEORY:

Variation within an emotion category but induced by + controlled by same internal structures + processes
(ie appraisal of harm to self, induced fight or flight response)

3

Appendix G – Keele University Ethical Approval Letter for Study Two

Keele
UNIVERSITY

02/03/2018

Dear Olly

PI: Olly Robinson
Title: Does speech change the way we feel after social interaction?
Ref: ERP3139

Thank you for submitting your application for review. The proposal was reviewed by the Panel Chair. I am pleased to inform you that your application has been approved by the Ethics Review Panel.

If the fieldwork goes beyond the date stated in your application, or there are any amendments to your study you must submit an 'application to amend study' form to the ERP administrator at research.governance@keele.ac.uk. This form is available via http://www.keele.ac.uk/researchsupport/researchethics/

If you have any queries please do not hesitate to contact me, in writing, via the ERP administrator, at research.governance@keele.ac.uk stating **ERP3139** in the subject line of the e-mail.

Yours sincerely
PP.

Dr Valerie Ball
Chair – Ethical Review Panel

Appendix H – Keele University Amendment Ethical Approval Letter for Study Three

Keele
UNIVERSITY

9th November 2018

Dear Olly,

PI: Olly Robertson
Title: Does speech change the way we feel after social interaction?
Ref: ERP3139

Thank you for your request to amend your study.

I am pleased to inform you that your request, received on 5th November 2018 has been approved by the Ethical Review Panel.

If the fieldwork goes beyond the date stated or there are any other amendments to your study you must submit an 'application to amend study' form to the ERP administrator at research.governance@keele.ac.uk stating **ERP3139** in the subject line of the e-mail. This form is available via http://www.keele.ac.uk/researchsupport/researchethics/

If you have any queries, please do not hesitate to contact me.

Yours sincerely
PP.

Val Ball
Chair – Ethical Review Panel

Appendix I – Keele University Amendment Ethical Approval Letter for Study Four

Keele UNIVERSITY

09/07/2018

Dear Olly

PI: Olly Robertson
Title: Does speech change the way we feel after social interaction?
Ref: ERP3139

Thank you for your request to amend your study.

I am pleased to inform you that your request, received on 2nd July 2018 has been approved by the Ethical Review Panel.

If the fieldwork goes beyond the date stated or there are any other amendments to your study you must submit an 'application to amend study' form to the ERP administrator at research.governance@keele.ac.uk stating **ERP3139** in the subject line of the e-mail. This form is available via http://www.keele.ac.uk/researchsupport/researchethics/

If you have any queries, please do not hesitate to contact me.

Yours sincerely
PP.

Dr Valerie Ball
Chair – Ethical Review Panel

Appendix J – Tilburg University Ethical Approval Letter for Study Four

TILBURG UNIVERSITY

SCHOOL OF SOCIAL AND BEHAVIORAL SCIENCES
ETHICS REVIEW BOARD

Department of Social Psychology
Prof. I. van Beest

Date
1 October 2018

Subject
Review research proposal

Date of your letter
27 September 2018

Reference
EC-2018.85

Telephone
013 466 3301

E-mail
erb@tilburguniversity.edu

Dear Prof. van Beest,

The Ethics Review Board (ERB) has discussed the revision of your research proposal *Does speech change the way we feel after social interaction?* and decided that the given suggestions and deliberations are sufficiently dealt with. There are no ethical concerns, so you are allowed to execute your research.

The Board wants to draw your attention to the terms and conditions in the appendix.

If changes are made to the research protocol, you need to submit an amendment to obtain ethics approval again.

Sincerely,

Dr. J.J.P. (Jolanda) Mathijssen
Chair Ethics Review Board

Attachment(s)
1

The ERB retains the right to at any time revise its decision regarding the implementation and the WMO status of any research study in response to changing regulations, research activities, or other unforeseen circumstances that are relevant to reviewing any such study. The ERB shall notify the principal researcher of its revised decision and of the reason or reasons for having revised its decision. (WMO: Wet medisch-wetenschappelijk onderzoek met mensen, Medical Research (Human Subjects) Act)

P.O. Box 90153 • 5000 LE Tilburg • The Netherlands • Visiting address > Warandelaan 2 • Tilburg • Telephone +31 13 466 91 11
www.tilburguniversity.edu

Appendix K – Studies Two and Four Consent Forms

CONSENT FORM

Title of Project: *Does speech change the way we feel after social interaction?*

Name and contact details of Principal Investigator: Olly Robertson, Room 1.23, Dorothy Hodgkin

Building, Keele University, 01782 734402,

O.M.Robertson@keele.ac.uk

1. I confirm that I have read and understood the information sheet dated July 2018 for the above study and have had the opportunity to ask questions ☐

2. I understand that my participation is voluntary and that I am free to withdraw at any time ☐

3. I agree to take part in this study. ☐

4. I agree to allow the dataset collected to be used for future research projects ☐

______________________	____________________	______________________
Name of participant	Date	Signature
______________________	____________________	______________________
Researcher	Date	Signature

Appendix L – Studies Two and Four Information Sheet

INFORMATION SHEET

Study Title: *Does speech change the way we feel after social interaction?*

Invitation

You are being invited to consider taking part in the research study "*Does speech change the way we feel after social interaction?"* This project is being conducted by the department of social psychology at Tilburg University and the centre for psychological research at Keele University. The research is being undertaken by Olly Robertson, Dr Richard Stephens, Dr Sammyh Khan, and Professor Ilja van Beest.

Before you decide whether or not you wish to take part, it is important for you to understand why this research is being done and what it will involve. Please take time to read this information carefully and discuss it with friends and relatives if you wish. Ask us if there is anything that is unclear or if you would like more information.

Aims of the Research

The current research is investigating how speech changes our emotions following social interaction. Emotions are phenomena with physiological (e.g. racing heart, levels of the stress hormone cortisol in saliva, changes in pupil size), behavioural (e.g. avoiding things that make us anxious), and cognitive (e.g. the way we think about an event) aspects. This study aims to explain which aspects of emotion is changed by speaking after social situations.

Why have I been invited?

You have received this information sheet as you have requested further information about being part of some research, which will recruit 740 participants, investigating the ways speech changes how we feel after social interaction.

Do I have to take part?

You are free to decide whether you wish to take part or not. If you do wish to take part, you will be asked to read and keep this information sheet and to sign a consent form to show you understand what is involved in the study. You are free to withdraw from this study at any time and without giving reasons. If you withdraw, all of your data will be withdrawn from the study. You will be unable to withdraw your data after the experiment as each participant's data will be anonymised and it will be impossible to find your data.

What will happen if I take part?

If you chose to participate, you will be invited to the lab at a time that is convenient for you. This study will involve completing a number of tasks, including playing a game on the computer and filling in a number of questionnaires and should take approximately 30 minutes. You will be asked to sit quietly for the first 5 minutes and breathe normally while your resting heart beat is recorded. Your heart rate will be continuously recorded until the end of the experiment. The size of your pupils will also be continuously recorded throughout. You will be asked to play a videogame over the internet with two other participants that are based at Keele University. Together you will play a game of 'catch' for 3-5 minutes. After the game you will be asked to complete a questionnaire asking you how you felt about the game. Then you will be asked to either read a script out loud, repeat a word for up to 3- minutes, talk to other people who have also just played a game of Cyberball, or sit in silence.

If you are asked to read the script: you may not necessarily have had the same experiences as is said in the script, but you will be asked to engage as much as possible when reading out loud.

If you are asked to repeat a word for up to 3-minutes: you may be asked to repeat a neutral word or a swear-word at a steady pace. If you find swearwords upsetting or offensive, it is important that you let the experimenter know before the start of the experiment.

If you are asked to talk to others, the experimenter will give you a topic of discussion. You will have up to 5 minutes to talk together about the topic. If you do not want to talk to others for any reason, it is important that you let the experimenter know before the start of the experiment.

After reading out loud, repeating the word, sitting in silence or talking to others, you will be asked to complete several questionnaires. These questionnaires will ask you how you feel after the game, as well as will ask you to rate how you behave in everyday life to change your emotions. All questionnaires can impact how well you can regulate your emotions, as well as your physiological aspects of an emotional experience.

You may be asked to provide three saliva samples. If so, you will be told about this before the experiment starts. Saliva samples are being collected to test for levels of a hormone called Cortisol.

Cortisol is a hormone associated with emotional responses, particularly stress. By measuring levels of cortisol, we can investigate whether there is an effect of speaking on hormonal responses associated with emotions. 24 participants will be randomly selected to provide a saliva sample. Saliva samples will be taken after your heart rate variance baseline measures has been taken, 25 minutes after the Cyberball game, and 45 minutes after the Cyberball game. In order to collect saliva, you will be given a swab at the end of the experiment and you will be asked to wipe the inside of your cheek with the swab. The swab will then be stored in a sterile tube until analysis. **If you are allergic to latex it is very important that you let this be known at the beginning of the experiment.**

Because you may be asked to provide a saliva sample, please do not consume any caffeine (e.g. coffee) or smoke for an hour before the experiment. Nicotine and caffeine can change levels of cortisol in saliva.

What are the benefits (if any) of taking part?

If you choose to take part in this study in the UK, you will receive a £10 Amazon Gift Voucher for participating. If you would prefer and you are a student at Keele University, your participation in the study can count towards accredited time for either the School of Psychology Research Participation Scheme or Keele SU's volunteering awards instead. If you choose to take part in this study and are a student of Tilburg University, your participation in the study can count towards partial course credit.

What are the risks (if any) of taking part?

You may feel concerned about issues surrounding confidentiality. Each participant is assigned a randomly generated number (a research ID) which will be used to group your data as belonging to the same person. This number will protect your identity and will be stored alongside your experimental data. Your name will not be kept alongside any data collected. It will only feature on the consent form, which will not be saved with any other data recorded as part of this project. Your consent form will be kept in a locked filing cabinet on university property to which only the principal investigator, Olly Robertson, has access to. All paper copies of questionnaires will be kept in a separate locked filing cabinet on university property to which only Olly Robertson has access to. No identifiable information will be present on any of these documents. Electronic data (i.e. heart rate recordings) will be stored on a password protected external computer, which only the principal investigator will be able to access. If you asked to provide a saliva sample, your sample will be stored in a tube only identifiable by your randomly generated research ID. It will be sent with all other samples to be analysed at a specialist laboratory at the University of East Anglia. The only analysis that will be conducted on the samples will be testing for levels of the hormone cortisol. No identifiable information will be available with any of the saliva samples. All data will be retained by the principal investigator for five years, after which it will be securely disposed of.

If you are asked to provide a saliva sample, you may be concerned about hygiene and infection control. All samples will be collected by the principle investigator (Olly Robertson) who has been trained in collecting and storing saliva samples. Both before and after saliva sample collection, Olly will wash her hands with disinfectant soap. Olly will wear latex gloves throughout collection and will provide you with a swab which you use to brush the inside of your cheek. If you are allergic to latex, it is very important that you make this known to Olly. If you are allergic to latex you will be excluded from this aspect of data collection. The swab will then be placed in a sterile tube. There are no outlined risks to participants in providing a saliva sample. However, if you feel ill or may be infectious from any virus or infection, please contact the research team to rearrange your appointment. This is to avoid cross infection between yourself, the research team and, potentially, other participants.

How will information about me be used?

Your data is being collected to investigate how speech changes the way we feel following social interaction. The data collected in this study may be used to inform future research investigating how effective speech is in regulating emotions in everyday scenarios. The data collected in this study may also be used to the written up as a research article.

Who will have access to information about me?

Only the research team will have access to the data collected as part of the study. Each participant will receive a randomly generated research ID which will be stored with their data. This means that all of your data will not contain any information which may identify you. All electronic data (i.e. heart rate measurements) will be stored in an encrypted file on a password protected computer which only Olly Robertson is able to access. All paper data (i.e. questionnaires) will be kept in a locked filing cabinet in a locked office on Keele University property or, if you have participated in the Netherlands, in a locked filing cabinet in a locked office on the campus of Tilburg University. All of the consent forms will be kept in a separate filing cabinet from any paper data in a locked office on Keele Property. After 5 years following the completion of Olly Robertson's PhD, all data will be destroyed appropriately.

If you provide a saliva sample, your sample will be placed into a sterile tube identified only by a randomly generated research ID. No further information about you will be stored with the saliva sample. Your sample will be sent – at the same time as all other samples – to a specialist laboratory at the University of East Anglia where it will be analysed. The only analysis which will be under taken on samples will be to test for levels of the hormone Cortisol. No other analyses will be undertaken on your sample. After analysis, all saliva samples will be destroyed at the laboratory at the University of East Anglia.

All of your personal data and data collected during the experiment is confidential. However, I do however have to work within the confines of current legislation over such matters as privacy and confidentiality, data protection and human rights and so offers of confidentiality may sometimes be overridden by law. For example, in circumstances whereby I am concerned over any actual or potential harm to yourself or others I must pass this information to the relevant authorities.

Who is funding and organising the research?

Research is being conducted as part of a PhD research project in the school of psychology at Keele University and has been funded by the Keele University Faculty of Natural Sciences.

What if there is a problem?

If you have a concern about any aspect of this study, you may wish to speak to the researcher(s) who will do their best to answer your questions. You should contact Olly Robertson on O.M.Robertson@keele.ac.uk or 01782 734402. Alternatively, if you do not wish to contact the researcher you may contact Dr Richard Stephens on R.Stephens@keele.ac.uk.

If you remain unhappy about the research and/or wish to raise a complaint about any aspect of the way that you have been approached or treated during the course of the study please write to the research integrity team at Keele University or the Ethics Review Board of Tilburg School of Social and Behavioural Sciences:-

Voor eventuele opmerkingen of klachten over dit onderzoek kunt u ook contact opnemen met de "Ethics Review Board" van Tilburg School of Social and Behavioral Sciences via ERB@tilburguniversity.edu.

Keele University Research Integrity Team

Directorate of Research, Innovation and Engagement

IC2 Building, Keele University, ST5 5NE

Email: research.governance@keele.ac.uk

Tel: 01782 733371

Ethics Review Board of Tilburg School of Social and Behavioural Sciences

ERB@tilburguniversity.edu.

Appendix M – Study Three Participant Information Sheet and Consent Form

Welkom bij het vragenlijstonderzoek over verschillende gevoelens en emoties bij Nederlandse mensen. Voordat u begint met het invullen van de vragenlijst, willen we u graag meer uitleg geven.

De vragenlijst begint met vragen over uw achtergrondgegevens zoals geslacht, leeftijd en dergelijke. Hierna volgen een aantal vragen over de gevoelens die u op dit moment ervaart. Hierna wordt u gevraagd om een korte persoonlijkheidstest in te vullen.

Het invullen van de vragenlijst duurt ongeveer 15-20 minuten. U kunt altijd stoppen met het onderzoek als u zich niet op uw gemak voelt of een vraag niet wilt beantwoorden. Hiervoor hoeft u geen reden op te geven.

De gegevens verkregen uit dit onderzoek zullen anoniem verwerkt worden. In rapporten over het onderzoek zullen gepubliceerde gegevens strikt vertrouwelijk en anoniem verwerkt worden en niet te herleiden zijn naar u als persoon.

Als u vragen heeft of meer informatie wenst, neem dan contact op met de primaire onderzoeker, Olly Robertson, op O.M.Robertson@keele.ac.uk

Voordat we beginnen met het onderzoek willen we u eerst vragen om toestemming te geven dat u wilt meedoen aan het onderzoek:

Ik heb bovenstaande tekst gelezen en ik ben me ervan bewust dat deelname aan dit vragenlijstonderzoek geheel vrijwillig is.

- ○ Ja
- ○ Nee

Ik begrijp dat ik op elk moment van het onderzoek kan stoppen.

- ○ Ja
- ○ Nee

Ik heb de mogelijkheid gekregen om verdere vragen te stellen of meer informatie te krijgen door contact op te nemen met de primaire onderzoeker.

- ○ Ja
- ○ Nee

Ik stem ermee in om deel te nemen aan het huidige onderzoek.

- ○ Ja
- ○ Nee

Ik ga ermee akkoord dat de verzamelde dataset gebruikt kan worden voor toekomstige onderzoeksprojecten.

- ○ Ja
- ○ Nee

Appendix N – Confirmatory Factor Analysis Results for Fundamental Needs and Mood Questionnaire

```
> summary(fit, fit.measures=TRUE, standardized = TRUE, rsquare = TRUE)
lavaan 0.6-8 ended normally after 40 iterations

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of model parameters                        28
  Number of observations                           381

Model Test User Model:
  Test statistic                               227.074
  Degrees of freedom                                38
  P-value (Chi-square)                           0.000

Model Test Baseline Model:
  Test statistic                              2434.380
  Degrees of freedom                                55
  P-value                                        0.000

User Model versus Baseline Model:
  Comparative Fit Index (CFI)                    0.921
  Tucker-Lewis Index (TLI)                       0.885

Loglikelihood and Information Criteria:
  Loglikelihood user model (H0)              -5783.761
  Loglikelihood unrestricted model (H1)      -5670.224

  Akaike (AIC)                               11623.523
  Bayesian (BIC)                             11733.921
  Sample-size adjusted Bayesian (BIC)        11645.082

Root Mean Square Error of Approximation:
  RMSEA                                          0.114
  90 Percent confidence interval - lower         0.100
  90 Percent confidence interval - upper         0.129
  P-value RMSEA <= 0.05                          0.000
```

```
Standardized Root Mean Square Residual:

  SRMR                                           0.059

Parameter Estimates:

  Standard errors                             Standard
  Information                                 Expected
  Information saturated (h1) model          Structured

Latent Variables:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  selfesteem =~
    selfesteem1R      1.000                               1.175    0.866
    selfesteem2      -0.463    0.039  -11.808    0.000   -0.544   -0.549
    selfesteem3R      0.897    0.047   19.140    0.000    1.055    0.774
  belonging =~
    belonging1R       1.000                               1.225    0.875
    belonging2       -0.427    0.042  -10.090    0.000   -0.523   -0.482
    belonging3R       0.975    0.040   24.122    0.000    1.195    0.871
  control =~
    control1          1.000                               0.844    0.715
    control2R        -1.120    0.086  -12.997    0.000   -0.945   -0.683
    control3          0.788    0.070   11.249    0.000    0.665    0.592
  meaningful =~
    meaningful1       1.000                               0.452    0.378
    meaningful2R     -1.821    0.244   -7.457    0.000   -0.823   -0.582

Covariances:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  selfesteem ~~
    belonging         1.504    0.123   12.190    0.000    1.045    1.045
    control          -0.992    0.094  -10.556    0.000   -1.000   -1.000
    meaningful       -0.568    0.080   -7.061    0.000   -1.069   -1.069
  belonging ~~
    control          -1.040    0.098  -10.660    0.000   -1.006   -1.006
    meaningful       -0.622    0.086   -7.216    0.000   -1.124   -1.124
  control ~~
```

meaningful	0.443	0.065	6.869	0.000	1.161	1.161

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
.selfesteem1R	0.459	0.046	10.082	0.000	0.459	0.250
.selfesteem2	0.683	0.050	13.553	0.000	0.683	0.698
.selfesteem3R	0.746	0.060	12.449	0.000	0.746	0.402
.belonging1R	0.458	0.042	10.849	0.000	0.458	0.234
.belonging2	0.900	0.066	13.636	0.000	0.900	0.767
.belonging3R	0.455	0.041	11.015	0.000	0.455	0.242
.control1	0.683	0.058	11.737	0.000	0.683	0.489
.control2R	1.021	0.084	12.203	0.000	1.021	0.533
.control3	0.819	0.063	12.998	0.000	0.819	0.649
.meaningful1	1.227	0.095	12.887	0.000	1.227	0.857
.meaningful2R	1.320	0.148	8.918	0.000	1.320	0.661
selfesteem	1.381	0.133	10.399	0.000	1.000	1.000
belonging	1.500	0.140	10.684	0.000	1.000	1.000
control	0.713	0.093	7.636	0.000	1.000	1.000
meaningful	0.204	0.063	3.226	0.001	1.000	1.000

R-Square:

	Estimate
selfesteem1R	0.750
selfesteem2	0.302
selfesteem3R	0.598
belonging1R	0.766
belonging2	0.233
belonging3R	0.758
control1	0.511
control2R	0.467
control3	0.351
meaningful1	0.143
meaningful2R	0.339

Appendix O – Principle Component Analysis for Positive and Negative Affect Schedule – Extended Responses

General Negative Affect

Correlation Matrix

		Afraid	Scared	Nervous	Guilty	Ashamed	Irritable	Hostile	Upset	Distressed
Correlation	Afraid	1.000	.737	.286	.182	.337	.001	.099	.254	-.097
	Scared	.737	1.000	.386	.245	.393	.056	.221	.241	.021
	Nervous	.286	.386	1.000	.111	.104	.181	.328	.364	.216
	Guilty	.182	.245	.111	1.000	.530	.457	.461	-.002	.076
	Ashamed	.337	.393	.104	.530	1.000	.211	.285	-.034	-.122
	Irritable	.001	.056	.181	.457	.211	1.000	.391	.239	.267
	Hostile	.099	.221	.328	.461	.285	.391	1.000	.271	.210
	Upset	.254	.241	.364	-.002	-.034	.239	.271	1.000	.293
	Distressed	-.097	.021	.216	.076	-.122	.267	.210	.293	1.000
Sig. (1-tailed)	Afraid		.000	.000	.003	.000	.495	.069	.000	.073
	Scared	.000		.000	.000	.000	.201	.000	.000	.374
	Nervous	.000	.000		.048	.060	.003	.000	.000	.001
	Guilty	.003	.000	.048		.000	.000	.000	.488	.127
	Ashamed	.000	.000	.060	.000		.001	.000	.308	.033
	Irritable	.495	.201	.003	.000	.001		.000	.000	.000
	Hostile	.069	.000	.000	.000	.000	.000		.000	.001
	Upset	.000	.000	.000	.488	.308	.000	.000		.000
	Distressed	.073	.374	.001	.127	.033	.000	.001	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.693
Bartlett's Test of Sphericity	Approx. Chi-Square	592.644
	df	36
	Sig.	.000

Communalities

	Initial	Extraction
Afraid	1.000	.366
Scared	1.000	.496
Nervous	1.000	.334
Guilty	1.000	.403
Ashamed	1.000	.347
Irritable	1.000	.268
Hostile	1.000	.424
Upset	1.000	.214
Distressed	1.000	.060

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.912	32.358	32.358	2.912	32.358	32.358
2	1.646	18.286	50.644			
3	1.490	16.561	67.205			
4	.688	7.643	74.848			
5	.655	7.283	82.131			
6	.550	6.113	88.243			
7	.464	5.160	93.403			
8	.358	3.979	97.382			
9	.236	2.618	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Afraid	.605
Scared	.704
Nervous	.578
Guilty	.635
Ashamed	.589
Irritable	.517
Hostile	.651
Upset	.463

Distressed	.245

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Fear

Correlation Matrix

		Afraid	Scared	Frightened	Nervous	Jittery	Shaky
Correlation	Afraid	1.000	.737	.177	.286	.041	.252
	Scared	.737	1.000	.281	.386	.064	.236
	Frightened	.177	.281	1.000	.496	.391	.189
	Nervous	.286	.386	.496	1.000	.317	.097
	Jittery	.041	.064	.391	.317	1.000	.518
	Shaky	.252	.236	.189	.097	.518	1.000
Sig. (1-tailed)	Afraid		.000	.004	.000	.271	.000
	Scared	.000		.000	.000	.167	.000
	Frightened	.004	.000		.000	.000	.002
	Nervous	.000	.000	.000		.000	.073
	Jittery	.271	.167	.000	.000		.000
	Shaky	.000	.000	.002	.073	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.612
Bartlett's Test of Sphericity	Approx. Chi-Square	418.756
	df	15
	Sig.	.000

Communalities

	Initial	Extraction
Afraid	1.000	.457
Scared	1.000	.546
Frightened	1.000	.429
Nervous	1.000	.470
Jittery	1.000	.305
Shaky	1.000	.298

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.505	41.743	41.743	2.505	41.743	41.743
2	1.373	22.885	64.627			
3	1.030	17.159	81.787			
4	.490	8.161	89.948			

5	.353	5.878	95.826			
6	.250	4.174	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Afraid	.676
Scared	.739
Frightened	.655
Nervous	.685
Jittery	.552
Shaky	.545

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Hostility

Correlation Matrix

		Angry	Loathing	Irritable	Hostile	Scornful	Disgusted
Correlation	Angry	1.000	.514	.356	.478	.229	-.053

	Loathing	.514	1.000	.294	.525	.564	-.029
	Irritable	.356	.294	1.000	.391	.275	-.150
	Hostile	.478	.525	.391	1.000	.276	.083
	Scornful	.229	.564	.275	.276	1.000	-.121
	Disgusted	-.053	-.029	-.150	.083	-.121	1.000
Sig. (1-tailed)	Angry		.000	.000	.000	.000	.213
	Loathing	.000		.000	.000	.000	.333
	Irritable	.000	.000		.000	.000	.012
	Hostile	.000	.000	.000		.000	.108
	Scornful	.000	.000	.000	.000		.035
	Disgusted	.213	.333	.012	.108	.035	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.697
Bartlett's Test of Sphericity	Approx. Chi-Square	314.968
	df	15

Sig.	.000

Communalities

	Initial	Extraction
Angry	1.000	.530
Loathing	1.000	.685
Irritable	1.000	.386
Hostile	1.000	.564
Scornful	1.000	.415
Disgusted	1.000	.012

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.591	43.184	43.184	2.591	43.184	43.184
2	1.082	18.030	61.214			
3	.863	14.391	75.605			
4	.669	11.146	86.751			
5	.483	8.053	94.804			
6	.312	5.196	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Angry	.728
Loathing	.828
Irritable	.621
Hostile	.751
Scornful	.644
Disgusted	-.108

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Guilt

Correlation Matrix

		Guilty	Ashamed	Blameworthy	Angryatself	Disgustedwithself	Dissatisfiedwithself
Correlation	Guilty	1.000	.530	.554	.547	.110	.136
	Ashamed	.530	1.000	.476	.471	-.120	-.004
	Blameworthy	.554	.476	1.000	.691	.081	.189
	Angryatself	.547	.471	.691	1.000	.153	.238
	Disgustedwithself	.110	-.120	.081	.153	1.000	.396

	Dissatisfiedwithself	.136	-.004	.189	.238	.396	1.000
Sig. (1-tailed)	Guilty		.000	.000	.000	.049	.020
	Ashamed	.000		.000	.000	.036	.475
	Blameworthy	.000	.000		.000	.112	.002
	Angryatself	.000	.000	.000		.011	.000
	Disgustedwithself	.049	.036	.112	.011		.000
	Dissatisfiedwithself	.020	.475	.002	.000	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.747
Bartlett's Test of Sphericity	Approx. Chi-Square	405.960
	df	15
	Sig.	.000

Communalities

	Initial	Extraction
Guilty	1.000	.642
Ashamed	1.000	.495
Blameworthy	1.000	.712
Angryatself	1.000	.726
Disgustedwithself	1.000	.037
Dissatisfiedwithself	1.000	.101

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.711	45.190	45.190	2.711	45.190	45.190
2	1.410	23.499	68.689			
3	.611	10.184	78.873			
4	.543	9.046	87.920			
5	.421	7.017	94.937			
6	.304	5.063	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Guilty	.801
Ashamed	.703
Blameworthy	.844
Angryatself	.852
Disgustedwithself	.192
Dissatisfiedwithself	.318

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Sadness

Correlation Matrix

		Sad	Blue	Downhearted	Alone	Lonely
Correlation	Sad	1.000	.311	.113	.337	.402
	Blue	.311	1.000	.286	.284	.390
	Downhearted	.113	.286	1.000	.223	.285
	Alone	.337	.284	.223	1.000	.333
	Lonely	.402	.390	.285	.333	1.000
Sig. (1-tailed)	Sad		.000	.045	.000	.000
	Blue	.000		.000	.000	.000
	Downhearted	.045	.000		.000	.000
	Alone	.000	.000	.000		.000
	Lonely	.000	.000	.000	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.745
Bartlett's Test of Sphericity	Approx. Chi-Square	158.787
	df	10
	Sig.	.000

Communalities

	Initial	Extraction
Sad	1.000	.441
Blue	1.000	.485
Downhearted	1.000	.278
Alone	1.000	.431
Lonely	1.000	.568

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.204	44.073	44.073	2.204	44.073	44.073
2	.905	18.092	62.165			
3	.716	14.319	76.484			
4	.624	12.478	88.962			
5	.552	11.038	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

Component

	1
Sad	.664
Blue	.696
Downhearted	.527
Alone	.657
Lonely	.754

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Fatigue

Correlation Matrix

		Sleepy	Tired	Drowsy	Sluggish
Correlation	Sleepy	1.000	.761	-.099	.121
	Tired	.761	1.000	-.190	.060
	Drowsy	-.099	-.190	1.000	-.029
	Sluggish	.121	.060	-.029	1.000
Sig. (1-tailed)	Sleepy		.000	.068	.035
	Tired	.000		.002	.185
	Drowsy	.068	.002		.331
	Sluggish	.035	.185	.331	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.505

Bartlett's Test of Sphericity	Approx. Chi-Square	207.149
	df	6
	Sig.	.000

Communalities

	Initial	Extraction
Sleepy	1.000	.832
Tired	1.000	.851
Drowsy	1.000	.106
Sluggish	1.000	.044

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.833	45.829	45.829	1.833	45.829	45.829
2	.984	24.590	70.419			
3	.952	23.812	94.230			
4	.231	5.770	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Sleepy	.912
Tired	.923
Drowsy	-.326
Sluggish	.210

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

General Positive Affect

Correlation Matrix

		Active	Alert	Attentive	Enthusiastic	Excited	Inspired	Interested	Proud	Strong	Determined
Correlation	Active	1.000	.492	-.081	.523	.507	.294	.571	.412	.386	.622
	Alert	.492	1.000	.009	.463	.419	.194	.481	.218	.438	.433
	Attentive	-.081	.009	1.000	-.114	-.126	.000	-.219	-.135	-.158	-.110
	Enthusiastic	.523	.463	-.114	1.000	.712	.397	.522	.471	.423	.446
	Excited	.507	.419	-.126	.712	1.000	.430	.550	.453	.473	.418
	Inspired	.294	.194	.000	.397	.430	1.000	.353	.477	.361	.348
	Interested	.571	.481	-.219	.522	.550	.353	1.000	.442	.424	.550
	Proud	.412	.218	-.135	.471	.453	.477	.442	1.000	.407	.493

	Strong	.386	.438	-.158	.423	.473	.361	.424	.407	1.000	.388
	Determined	.622	.433	-.110	.446	.418	.348	.550	.493	.388	1.000
Sig. (1-tailed)	Active		.000	.112	.000	.000	.000	.000	.000	.000	.000
	Alert	.000		.447	.000	.000	.002	.000	.000	.000	.000
	Attentive	.112	.447		.043	.029	.498	.000	.021	.009	.049
	Enthusiastic	.000	.000	.043		.000	.000	.000	.000	.000	.000
	Excited	.000	.000	.029	.000		.000	.000	.000	.000	.000
	Inspired	.000	.002	.498	.000	.000		.000	.000	.000	.000
	Interested	.000	.000	.000	.000	.000	.000		.000	.000	.000
	Proud	.000	.000	.021	.000	.000	.000	.000		.000	.000
	Strong	.000	.000	.009	.000	.000	.000	.000	.000		.000
	Determined	.000	.000	.049	.000	.000	.000	.000	.000	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.878
Bartlett's Test of Sphericity	Approx. Chi-Square	880.852
	df	45
	Sig.	.000

Communalities

	Initial	Extraction
Active	1.000	.574

Alert	1.000	.406
Attentive	1.000	.037
Enthusiastic	1.000	.613
Excited	1.000	.614
Inspired	1.000	.333
Interested	1.000	.602
Proud	1.000	.459
Strong	1.000	.440
Determined	1.000	.542

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.619	46.186	46.186	4.619	46.186	46.186
2	1.038	10.378	56.564			
3	.978	9.777	66.341			
4	.755	7.554	73.895			
5	.662	6.620	80.515			
6	.507	5.071	85.586			
7	.422	4.224	89.810			
8	.408	4.076	93.886			
9	.341	3.414	97.301			

10	.270	2.699	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Active	.758
Alert	.637
Attentive	-.191
Enthusiastic	.783
Excited	.783
Inspired	.577
Interested	.776
Proud	.677
Strong	.664
Determined	.736

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Joviality

Correlation Matrix

		Cheerful	Happy	Joyful	Delighted	Enthusiastic	Excited	Lively	Energetic
Correlation	Cheerful	1.000	.062	.045	.163	-.091	-.002	.063	.149
	Happy	.062	1.000	.653	.523	.536	.471	.654	.156
	Joyful	.045	.653	1.000	.583	.660	.580	.625	.346
	Delighted	.163	.523	.583	1.000	.504	.459	.542	.341
	Enthusiastic	-.091	.536	.660	.504	1.000	.712	.571	.217
	Excited	-.002	.471	.580	.459	.712	1.000	.574	.231
	Lively	.063	.654	.625	.542	.571	.574	1.000	.193
	Energetic	.149	.156	.346	.341	.217	.231	.193	1.000
Sig. (1-tailed)	Cheerful		.178	.252	.007	.086	.491	.174	.012
	Happy	.178		.000	.000	.000	.000	.000	.009
	Joyful	.252	.000		.000	.000	.000	.000	.000
	Delighted	.007	.000	.000		.000	.000	.000	.000
	Enthusiastic	.086	.000	.000	.000		.000	.000	.000
	Excited	.491	.000	.000	.000	.000		.000	.000
	Lively	.174	.000	.000	.000	.000	.000		.002
	Energetic	.012	.009	.000	.000	.000	.000	.002	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.861
Bartlett's Test of Sphericity	Approx. Chi-Square	780.699
	df	28

Sig.	.000

Communalities

	Initial	Extraction
Cheerful	1.000	.007
Happy	1.000	.612
Joyful	1.000	.737
Delighted	1.000	.566
Enthusiastic	1.000	.667
Excited	1.000	.608
Lively	1.000	.661
Energetic	1.000	.159

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.016	50.199	50.199	4.016	50.199	50.199
2	1.158	14.473	64.673			
3	.850	10.624	75.296			
4	.599	7.486	82.782			
5	.458	5.719	88.502			

6	.377	4.713	93.214			
7	.290	3.627	96.841			
8	.253	3.159	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Cheerful	.081
Happy	.782
Joyful	.859
Delighted	.752
Enthusiastic	.817
Excited	.780
Lively	.813
Energetic	.399

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Self-Assurance

Correlation Matrix

	Proud	Strong	Confident	Bold	Fearless	Daring

Correlation	Proud	1.000	.407	.430	.367	.271	.262
	Strong	.407	1.000	.285	.324	.274	.418
	Confident	.430	.285	1.000	.306	.412	.283
	Bold	.367	.324	.306	1.000	.195	.240
	Fearless	.271	.274	.412	.195	1.000	.321
	Daring	.262	.418	.283	.240	.321	1.000
Sig. (1-tailed)	Proud		.000	.000	.000	.000	.000
	Strong	.000		.000	.000	.000	.000
	Confident	.000	.000		.000	.000	.000
	Bold	.000	.000	.000		.002	.000
	Fearless	.000	.000	.000	.002		.000
	Daring	.000	.000	.000	.000	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.780
Bartlett's Test of Sphericity	Approx. Chi-Square	246.953
	df	15
	Sig.	.000

Communalities

	Initial	Extraction
Proud	1.000	.500
Strong	1.000	.481

Confident	1.000	.485
Bold	1.000	.363
Fearless	1.000	.379
Daring	1.000	.399

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.606	43.439	43.439	2.606	43.439	43.439
2	.871	14.515	57.954			
3	.834	13.896	71.850			
4	.647	10.780	82.630			
5	.558	9.308	91.938			
6	.484	8.062	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Proud	.707
Strong	.694

Confident	.696
Bold	.603
Fearless	.615
Daring	.631

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Serenity

Correlation Matrix

		Calm	Relaxed	Atease
Correlation	Calm	1.000	.561	.698
	Relaxed	.561	1.000	.502
	Atease	.698	.502	1.000
Sig. (1-tailed)	Calm		.000	.000
	Relaxed	.000		.000
	Atease	.000	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.683
Bartlett's Test of Sphericity	Approx. Chi-Square	242.700
	df	3
	Sig.	.000

Communalities

	Initial	Extraction
Calm	1.000	.796
Relaxed	1.000	.631
Atease	1.000	.752

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.179	72.617	72.617	2.179	72.617	72.617
2	.526	17.528	90.145			
3	.296	9.855	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Calm	.892
Relaxed	.794

Atease	.867

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Attentiveness

Correlation Matrix

		Alert	Attentive	Concentrating	Determined
Correlation	Alert	1.000	.009	.459	.433
	Attentive	.009	1.000	-.289	-.110
	Concentrating	.459	-.289	1.000	.441
	Determined	.433	-.110	.441	1.000
Sig. (1-tailed)	Alert		.447	.000	.000
	Attentive	.447		.000	.049
	Concentrating	.000	.000		.000
	Determined	.000	.049	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.623
Bartlett's Test of Sphericity	Approx. Chi-Square	146.932
	df	6
	Sig.	.000

Communalities

	Initial	Extraction
Alert	1.000	.563
Attentive	1.000	.112
Concentrating	1.000	.681
Determined	1.000	.589

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.945	48.617	48.617	1.945	48.617	48.617
2	1.031	25.784	74.401			
3	.571	14.281	88.682			
4	.453	11.318	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Alert	.750
Attentive	-.334

Concentrating	.825
Determined	.768

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Surprise

Correlation Matrix

		Surprised	Amazed	Astonished
Correlation	Surprised	1.000	.256	.436
	Amazed	.256	1.000	.286
	Astonished	.436	.286	1.000
Sig. (1-tailed)	Surprised		.000	.000
	Amazed	.000		.000
	Astonished	.000	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.609
Bartlett's Test of Sphericity	Approx. Chi-Square	71.778
	df	3
	Sig.	.000

Communalities

	Initial	Extraction
Surprised	1.000	.606
Amazed	1.000	.420
Astonished	1.000	.634

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.660	55.320	55.320	1.660	55.320	55.320
2	.778	25.946	81.267			
3	.562	18.733	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
Surprised	.779
Amazed	.648
Astonished	.796

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

GPA-GNA 2-Component Solution

Correlation Matrix

		afraid	scared	nervous	guilty	ashamed	hostile	upset	distressed	irritable	jittery	active	alert	attentive	enthusiastic	excited	inspired	interested	proud	strong	determined
Correlation	afraid	1.000	.737	.286	.182	.337	.099	.254	-.097	.001	.041	-.201	-.050	.205	.004	-.010	-.008	-.300	-.067	-.075	-.251
	scared	.737	1.000	.386	.245	.393	.221	.241	.021	.056	.064	-.077	-.011	.195	.124	.070	.075	-.227	.053	-.022	-.097
	nervous	.286	.386	1.000	.111	.104	.328	.364	.216	.181	.317	.133	.363	.147	.294	.283	.178	.183	.077	.093	.131
	guilty	.182	.245	.111	1.000	.530	.461	-.002	.076	.457	.424	-.050	-.046	.329	-.087	-.059	.148	-.164	.049	-.203	-.035
	ashamed	.337	.393	.104	.530	1.000	.285	-.034	-.122	.211	.300	-.299	-.243	.425	-.226	-.204	.171	-.437	-.176	-.256	-.273
	hostile	.099	.221	.328	.461	.285	1.000	.271	.210	.391	.594	.148	.134	.214	.101	.213	.340	.044	.193	.021	.112
	upset	.254	.241	.364	-.002	-.034	.271	1.000	.293	.239	.105	.055	.377	.070	.119	.173	-.067	.021	-.027	.215	.099

	distressed	-.097	.021	.216	.076	-.122	.210	.293	1.000	.267	.323	.414	.238	-.128	.240	.239	.128	.319	.179	.253	.359
	irritable	.001	.056	.181	.457	.211	.391	.239	.267	1.000	.348	.035	.135	.117	-.084	-.053	.049	.056	-.041	-.068	.115
	jittery	.041	.064	.317	.424	.300	.594	.105	.323	.348	1.000	.158	.150	.123	.136	.200	.441	.120	.238	-.006	.167
	active	-.201	-.077	.133	-.050	-.299	.148	.055	.414	.035	.158	1.000	.492	-.081	.523	.507	.294	.571	.412	.386	.622
	alert	-.050	-.011	.363	-.046	-.243	.134	.377	.238	.135	.150	.492	1.000	.009	.463	.419	.194	.481	.218	.438	.433
	attentive	.205	.195	.147	.329	.425	.214	.070	-.128	.117	.123	-.081	.009	1.000	-.114	-.126	.000	-.219	-.135	-.158	-.110
	enthusiastic	.004	.124	.294	-.087	-.226	.101	.119	.240	-.084	.136	.523	.463	-.114	1.000	.712	.397	.522	.471	.423	.446
	excited	-.010	.070	.283	-.059	-.204	.213	.173	.239	-.053	.200	.507	.419	-.126	.712	1.000	.430	.550	.453	.473	.418
	inspired	-.008	.075	.178	.148	.171	.340	-.067	.128	.049	.441	.294	.194	.000	.397	.430	1.000	.353	.477	.361	.348

	interested	-.300	-.227	.183	-.164	-.437	.044	.021	.319	.056	.120	.571	.481	-.219	.522	.550	.353	1.000	.442	.424	.550
	proud	-.067	.053	.077	.049	-.176	.193	-.027	.179	-.041	.238	.412	.218	-.135	.471	.453	.477	.442	1.000	.407	.493
	strong	-.075	-.022	.093	-.203	-.256	.021	.215	.253	-.068	-.006	.386	.438	-.158	.423	.473	.361	.424	.407	1.000	.388
	determined	-.251	-.097	.131	-.035	-.273	.112	.099	.359	.115	.167	.622	.433	-.110	.446	.418	.348	.550	.493	.388	1.000
Sig. (1-tailed)	afraid		.000	.000	.003	.000	.069	.000	.073	.495	.271	.001	.227	.001	.474	.442	.454	.000	.156	.131	.000
	scared	.000		.000	.000	.000	.000	.000	.374	.201	.167	.123	.432	.002	.031	.146	.129	.000	.213	.373	.073
	nervous	.000	.000		.048	.060	.000	.000	.001	.003	.000	.022	.000	.013	.000	.000	.004	.003	.125	.081	.024
	guilty	.003	.000	.048		.000	.000	.488	.127	.000	.000	.227	.245	.000	.096	.188	.013	.007	.233	.001	.299
	ashamed	.000	.000	.060	.000		.000	.308	.033	.001	.000	.000	.000	.000	.000	.001	.005	.000	.004	.000	.000
	hostile	.069	.000	.000	.000	.000		.000	.001	.000	.000	.013	.022	.001	.065	.001	.000	.253	.002	.377	.047
	upset	.000	.000	.000	.488	.308	.000		.000	.000	.057	.206	.000	.148	.036	.005	.157	.378	.341	.001	.069

distressed	.073	.374	.001	.127	.033	.001	.000		.000	.000	.000	.000	.027	.000	.000	.027	.000	.003	.000	.000
irritable	.495	.201	.003	.000	.001	.000	.000	.000		.000	.300	.021	.040	.104	.214	.232	.199	.270	.155	.042
jittery	.271	.167	.000	.000	.000	.000	.057	.000	.000		.009	.012	.032	.020	.001	.000	.035	.000	.466	.006
active	.001	.123	.022	.227	.000	.013	.206	.000	.300	.009		.000	.112	.000	.000	.000	.000	.000	.000	.000
alert	.227	.432	.000	.245	.000	.022	.000	.000	.021	.012	.000		.447	.000	.000	.002	.000	.000	.000	.000
attentive	.001	.002	.013	.000	.000	.001	.148	.027	.040	.032	.112	.447		.043	.029	.498	.000	.021	.009	.049
enthusiastic	.474	.031	.000	.096	.000	.065	.036	.000	.104	.020	.000	.000	.043		.000	.000	.000	.000	.000	.000
excited	.442	.146	.000	.188	.001	.001	.005	.000	.214	.001	.000	.000	.029	.000		.000	.000	.000	.000	.000
inspired	.454	.129	.004	.013	.005	.000	.157	.027	.232	.000	.000	.002	.498	.000	.000		.000	.000	.000	.000
interested	.000	.000	.003	.007	.000	.253	.378	.000	.199	.035	.000	.000	.000	.000	.000	.000		.000	.000	.000
proud	.156	.213	.125	.233	.004	.002	.341	.003	.270	.000	.000	.000	.021	.000	.000	.000	.000		.000	.000
strong	.131	.373	.081	.001	.000	.377	.001	.000	.155	.466	.000	.000	.009	.000	.000	.000	.000	.000		.000
determined	.000	.073	.024	.299	.000	.047	.069	.000	.042	.006	.000	.000	.049	.000	.000	.000	.000	.000	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.805
Bartlett's Test of Sphericity	Approx. Chi-Square	2028.402
	df	190
	Sig.	.000

Communalities

	Initial	Extraction
afraid	1.000	.321
scared	1.000	.373
nervous	1.000	.368
guilty	1.000	.497
ashamed	1.000	.607
hostile	1.000	.542
upset	1.000	.168
distressed	1.000	.270
irritable	1.000	.257
jittery	1.000	.471
active	1.000	.583
alert	1.000	.437
attentive	1.000	.269
enthusiastic	1.000	.566
excited	1.000	.584
inspired	1.000	.372

interested	1.000	.659
proud	1.000	.411
strong	1.000	.429
determined	1.000	.548

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.229	26.146	26.146	5.229	26.146	26.146	5.228
2	3.502	17.511	43.656	3.502	17.511	43.656	3.512
3	1.891	9.455	53.111				
4	1.572	7.858	60.969				
5	.978	4.892	65.861				
6	.842	4.210	70.071				
7	.787	3.937	74.008				
8	.676	3.379	77.387				
9	.606	3.031	80.419				
10	.581	2.907	83.325				
11	.479	2.395	85.720				
12	.442	2.211	87.931				

13	.424	2.122	90.053				
14	.402	2.011	92.064				
15	.331	1.654	93.718				
16	.306	1.530	95.248				
17	.282	1.412	96.660				
18	.262	1.312	97.972				
19	.222	1.108	99.080				
20	.184	.920	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Component Matrix[a]

	Component	
	1	2
afraid	-.169	.541
scared	-.024	.610
nervous	.359	.489
guilty	-.050	.703
ashamed	-.335	.704
hostile	.293	.676
upset	.248	.326
distressed	.500	.143
irritable	.112	.494
jittery	.341	.595
active	.755	-.114

alert	.660	.035
attentive	-.177	.487
enthusiastic	.752	-.025
excited	.764	.014
inspired	.553	.256
interested	.768	-.262
proud	.641	-.006
strong	.633	-.168
determined	.732	-.108

Extraction Method: Principal Component Analysis.

a. 2 components extracted.

Pattern Matrix[a]

	Component	
	1	2
afraid	-.210	.537
scared	-.071	.610
nervous	.321	.499
guilty	-.103	.703
ashamed	-.388	.695
hostile	.241	.684
upset	.223	.332
distressed	.488	.156
irritable	.074	.498

jittery	.295	.605
active	.762	-.094
alert	.656	.052
attentive	-.214	.483
enthusiastic	.753	-.006
excited	.762	.034
inspired	.533	.271
interested	.787	-.242
proud	.640	.011
strong	.645	-.151
determined	.739	-.089

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.[a]
a. Rotation converged in 5 iterations.

Structure Matrix

	Component	
	1	2
afraid	-.183	.526
scared	-.040	.607
nervous	.346	.515
guilty	-.068	.697
ashamed	-.354	.676

hostile	.275	.696
upset	.240	.344
distressed	.496	.181
irritable	.099	.501
jittery	.325	.619
active	.758	-.056
alert	.659	.085
attentive	-.190	.473
enthusiastic	.752	.032
excited	.764	.072
inspired	.546	.298
interested	.775	-.203
proud	.641	.043
strong	.637	-.119
determined	.735	-.052

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Component Correlation Matrix

Component	1	2
1	1.000	.050
2	.050	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

GPA-GNA 4-Component Solution

Correlation Matrix

		afraid	scared	nervous	guilty	ashamed	hostile	upset	distressed	irritable	jittery	active	alert	attentive	enthusiastic	excited	inspired	interested	proud	strong	determined
Correlation	afraid	1.000	.737	.286	.182	.337	.099	.254	-.097	.001	.041	-.201	-.050	.205	.004	-.010	-.008	-.300	-.067	-.075	-.251
	scared	.737	1.000	.386	.245	.393	.221	.241	.021	.056	.064	-.077	-.011	.195	.124	.070	.075	-.227	.053	-.022	-.097
	nervous	.286	.386	1.000	.111	.104	.328	.364	.216	.181	.317	.133	.363	.147	.294	.283	.178	.183	.077	.093	.131
	guilty	.182	.245	.111	1.000	.530	.461	-.002	.076	.457	.424	-.050	-.046	.329	-.087	-.059	.148	-.164	.049	-.203	-.035
	ashamed	.337	.393	.104	.530	1.000	.285	-.034	-.122	.211	.300	-.299	-.243	.425	-.226	-.204	.171	-.437	-.176	-.256	-.273
	hostile	.099	.221	.328	.461	.285	1.000	.271	.210	.391	.594	.148	.134	.214	.101	.213	.340	.044	.193	.021	.112

	upset	.254	.241	.364	-.002	-.034	.271	1.000	.293	.239	.105	.055	.377	.070	.119	.173	-.067	.021	-.027	.215	.099
	distressed	-.097	.021	.216	.076	-.122	.210	.293	1.000	.267	.323	.414	.238	-.128	.240	.239	.128	.319	.179	.253	.359
	irritable	.001	.056	.181	.457	.211	.391	.239	.267	1.000	.348	.035	.135	.117	-.084	-.053	.049	.056	-.041	-.068	.115
	jittery	.041	.064	.317	.424	.300	.594	.105	.323	.348	1.000	.158	.150	.123	.136	.200	.441	.120	.238	-.006	.167
	active	-.201	-.077	.133	-.050	-.299	.148	.055	.414	.035	.158	1.000	.492	-.081	.523	.507	.294	.571	.412	.386	.622
	alert	-.050	-.011	.363	-.046	-.243	.134	.377	.238	.135	.150	.492	1.000	.009	.463	.419	.194	.481	.218	.438	.433
	attentive	.205	.195	.147	.329	.425	.214	.070	-.128	.117	.123	-.081	.009	1.000	-.114	-.126	.000	-.219	-.135	-.158	-.110
	enthusiastic	.004	.124	.294	-.087	-.226	.101	.119	.240	-.084	.136	.523	.463	-.114	1.000	.712	.397	.522	.471	.423	.446
	excited	-.010	.070	.283	-.059	-.204	.213	.173	.239	-.053	.200	.507	.419	-.126	.712	1.000	.430	.550	.453	.473	.418

	inspired	-.008	.075	.178	.148	.171	.340	-.067	.128	.049	.441	.294	.194	.000	.397	.430	1.000	.353	.477	.361	.348
	interested	-.300	-.227	.183	-.164	-.437	.044	.021	.319	.056	.120	.571	.481	-.219	.522	.550	.353	1.000	.442	.424	.550
	proud	-.067	.053	.077	.049	-.176	.193	-.027	.179	-.041	.238	.412	.218	-.135	.471	.453	.477	.442	1.000	.407	.493
	strong	-.075	-.022	.093	-.203	-.256	.021	.215	.253	-.068	-.006	.386	.438	-.158	.423	.473	.361	.424	.407	1.000	.388
	determined	-.251	-.097	.131	-.035	-.273	.112	.099	.359	.115	.167	.622	.433	-.110	.446	.418	.348	.550	.493	.388	1.000
Sig. (1-tailed)	afraid		.000	.000	.003	.000	.069	.000	.073	.495	.271	.001	.227	.001	.474	.442	.454	.000	.156	.131	.000
	scared	.000		.000	.000	.000	.000	.000	.374	.201	.167	.123	.432	.002	.031	.146	.129	.000	.213	.373	.073
	nervous	.000	.000		.048	.060	.000	.000	.001	.003	.000	.022	.000	.013	.000	.000	.004	.003	.125	.081	.024
	guilty	.003	.000	.048		.000	.000	.488	.127	.000	.000	.227	.245	.000	.096	.188	.013	.007	.233	.001	.299
	ashamed	.000	.000	.060	.000		.000	.308	.033	.001	.000	.000	.000	.000	.000	.001	.005	.000	.004	.000	.000
	hostile	.069	.000	.000	.000	.000		.000	.001	.000	.000	.013	.022	.001	.065	.001	.000	.253	.002	.377	.047

	upset	.000	.000	.000	.488	.308	.000		.000	.000	.057	.206	.000	.148	.036	.005	.157	.378	.341	.001	.069
	distressed	.073	.374	.001	.127	.033	.001	.000		.000	.000	.000	.000	.027	.000	.000	.027	.000	.003	.000	.000
	irritable	.495	.201	.003	.000	.001	.000	.000	.000		.000	.300	.021	.040	.104	.214	.232	.199	.270	.155	.042
	jittery	.271	.167	.000	.000	.000	.000	.057	.000	.000		.009	.012	.032	.020	.001	.000	.035	.000	.466	.006
	active	.001	.123	.022	.227	.000	.013	.206	.000	.300	.009		.000	.112	.000	.000	.000	.000	.000	.000	.000
	alert	.227	.432	.000	.245	.000	.022	.000	.000	.021	.012	.000		.447	.000	.000	.002	.000	.000	.000	.000
	attentive	.001	.002	.013	.000	.000	.001	.148	.027	.040	.032	.112	.447		.043	.029	.498	.000	.021	.009	.049
	enthusiastic	.474	.031	.000	.096	.000	.065	.036	.000	.104	.020	.000	.000	.043		.000	.000	.000	.000	.000	.000
	excited	.442	.146	.000	.188	.001	.001	.005	.000	.214	.001	.000	.000	.029	.000		.000	.000	.000	.000	.000
	inspired	.454	.129	.004	.013	.005	.000	.157	.027	.232	.000	.000	.002	.498	.000	.000		.000	.000	.000	.000
	interested	.000	.000	.003	.007	.000	.253	.378	.000	.199	.035	.000	.000	.000	.000	.000	.000		.000	.000	.000
	proud	.156	.213	.125	.233	.004	.002	.341	.003	.270	.000	.000	.000	.021	.000	.000	.000	.000		.000	.000
	strong	.131	.373	.081	.001	.000	.377	.001	.000	.155	.466	.000	.000	.009	.000	.000	.000	.000	.000		.000

determin ed	.00 0	.073	.024	.29 9	.000	.047	.06 9	.000	.042	.00 6	.00 0	.00 0	.049	.000	.000	.000	.000	.00 0	.000	

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.805
Bartlett's Test of Sphericity	Approx. Chi-Square	2028.402
	df	190
	Sig.	.000

Communalities

	Initial	Extraction
afraid	1.000	.758
scared	1.000	.757
nervous	1.000	.531
guilty	1.000	.646
ashamed	1.000	.695
hostile	1.000	.615
upset	1.000	.682
distressed	1.000	.469
irritable	1.000	.619
jittery	1.000	.646
active	1.000	.592
alert	1.000	.578

attentive	1.000	.271
enthusiastic	1.000	.680
excited	1.000	.661
inspired	1.000	.676
interested	1.000	.672
proud	1.000	.593
strong	1.000	.477
determined	1.000	.575

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	5.229	26.146	26.146	5.229	26.146	26.146	4.921
2	3.502	17.511	43.656	3.502	17.511	43.656	3.103
3	1.891	9.455	53.111	1.891	9.455	53.111	2.624
4	1.572	7.858	60.969	1.572	7.858	60.969	2.513
5	.978	4.892	65.861				
6	.842	4.210	70.071				
7	.787	3.937	74.008				
8	.676	3.379	77.387				

9	.606	3.031	80.419				
10	.581	2.907	83.325				
11	.479	2.395	85.720				
12	.442	2.211	87.931				
13	.424	2.122	90.053				
14	.402	2.011	92.064				
15	.331	1.654	93.718				
16	.306	1.530	95.248				
17	.282	1.412	96.660				
18	.262	1.312	97.972				
19	.222	1.108	99.080				
20	.184	.920	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Component Matrix[a]

	Component			
	1	2	3	4
afraid	-.169	.541	.642	.158
scared	-.024	.610	.590	.189
nervous	.359	.489	.351	-.199
guilty	-.050	.703	-.379	.072
ashamed	-.335	.704	-.110	.275
hostile	.293	.676	-.266	-.047
upset	.248	.326	.408	-.590

distressed	.500	.143	-.139	-.424
irritable	.112	.494	-.384	-.464
jittery	.341	.595	-.418	.033
active	.755	-.114	-.086	-.038
alert	.660	.035	.195	-.322
attentive	-.177	.487	-.006	.049
enthusiastic	.752	-.025	.254	.222
excited	.764	.014	.189	.203
inspired	.553	.256	-.196	.516
interested	.768	-.262	-.106	-.032
proud	.641	-.006	-.085	.418
strong	.633	-.168	.213	.057
determined	.732	-.108	-.161	-.035

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

Pattern Matrix[a]

	Component			
	1	2	3	4
afraid	-.042	-.026	.869	-.079
scared	.092	.075	.855	-.084
nervous	.209	.168	.443	-.463
guilty	-.086	.786	.066	.082
ashamed	-.204	.586	.378	.272
hostile	.163	.716	.077	-.152

upset	-.081	-.008	.302	-.790
distressed	.191	.238	-.219	-.515
irritable	-.217	.637	-.220	-.430
jittery	.240	.761	-.071	-.032
active	.643	.031	-.214	-.199
alert	.423	-.052	.019	-.544
attentive	-.162	.362	.273	.020
enthusiastic	.804	-.125	.191	-.067
excited	.797	-.051	.150	-.076
inspired	.727	.376	.067	.349
interested	.666	-.068	-.304	-.168
proud	.779	.108	-.011	.242
strong	.617	-.218	.047	-.156
determined	.618	.084	-.270	-.168

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.[a]

a. Rotation converged in 13 iterations.

Structure Matrix

	Component			
	1	2	3	4
afraid	-.120	.118	.867	-.041
scared	.020	.220	.855	-.085
nervous	.273	.274	.433	-.510
guilty	-.090	.789	.204	.054

ashamed	-.292	.624	.503	.294
hostile	.211	.743	.170	-.233
upset	.070	.088	.286	-.762
distressed	.342	.241	-.217	-.581
irritable	-.075	.623	-.106	-.426
jittery	.278	.758	.025	-.139
active	.714	.028	-.285	-.357
alert	.547	-.003	-.052	-.639
attentive	-.186	.400	.349	.043
enthusiastic	.795	-.067	.080	-.241
excited	.796	.001	.052	-.254
inspired	.649	.386	.058	.158
interested	.737	-.087	-.394	-.328
proud	.727	.114	-.072	.053
strong	.642	-.182	-.060	-.285
determined	.689	.069	-.329	-.326

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Component Correlation Matrix

Component	1	2	3	4
1	1.000	.029	-.110	-.233
2	.029	1.000	.161	-.063
3	-.110	.161	1.000	.030
4	-.233	-.063	.030	1.000

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Appendix P – Inferential Statistics for Study Two

Cyberball Manipulation

Fundamental Needs Questionnaire

T-Test: Comparison of FNQ subscale scores to midpoint

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	selfesteem	2.3358	137	.61503	.05255
	MidpointA	2.500	137	.0000	.0000
Pair 2	belonging	1.8662	137	.67211	.05742
	MidpointA	2.500	137	.0000	.0000
Pair 3	control	1.8127	137	.64785	.05535
	MidpointA	2.500	137	.0000	.0000
Pair 4	meaningful	2.2518	137	.73795	.06305
	MidpointA	2.500	137	.0000	.0000

Paired Samples Correlations

				Significance	
		N	Correlation	One-Sided p	Two-Sided p
Pair 1	selfesteem & MidpointA	137	.	.	.
Pair 2	belonging & MidpointA	137	.	.	.
Pair 3	control & MidpointA	137	.	.	.
Pair 4	meaningful & MidpointA	137	.	.	.

Paired Samples Test

		Paired Differences					t	df	Signific
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			One-Sided p
Pair 1	selfesteem - MidpointA	-.16423	.61503	.05255	-.26815	-.06032	-3.126	136	.001
Pair 2	belonging - MidpointA	-.63382	.67211	.05742	-.74738	-.52026	-11.038	136	<.001
Pair 3	control - MidpointA	-.68735	.64785	.05535	-.79680	-.57789	-12.418	136	<.001
Pair 4	meaningful - MidpointA	-.24818	.73795	.06305	-.37286	-.12349	-3.936	136	<.001

Paired Samples Effect Sizes

			Standardizer[a]	Point Estimate	95% Confidence Interval	
					Lower	Upper
Pair 1	selfesteem - MidpointA	Cohen's d	.61503	-.267	-.437	-.096
		Hedges' correction	.61673	-.266	-.436	-.096
Pair 2	belonging - MidpointA	Cohen's d	.67211	-.943	-1.143	-.740
		Hedges' correction	.67397	-.940	-1.140	-.738
Pair 3	control - MidpointA	Cohen's d	.64785	-1.061	-1.269	-.850
		Hedges' correction	.64964	-1.058	-1.266	-.848
Pair 4	meaningful - MidpointA	Cohen's d	.73795	-.336	-.508	-.164
		Hedges' correction	.74000	-.335	-.506	-.163

a. The denominator used in estimating the effect sizes.

Cohen's d uses the sample standard deviation of the mean difference.

Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

T-Test: Comparison of Mood subscale scores to midpoint

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	MoodScale	36.3859%	137	12.84953%	1.09781%
	MoodMidpoint	50.0000%	137	0.00000%	0.00000%

Paired Samples Correlations

				Significance	
		N	Correlation	One-Sided p	Two-Sided p
Pair 1	MoodScale & MoodMidpoint	137	.	.	.

Paired Samples Test

Paired Differences							
			95% Confidence Interval of the Difference				
Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	One-Sid

Pair 1	MoodScale - MoodMidpoint	-13.61406%	12.84953%	1.09781%	-15.78505%	-11.44308%	-12.401	136

Paired Samples Effect Sizes

			Standardizer[a]	Point Estimate	95% Confidence Interval	
					Lower	Upper
Pair 1	MoodScale - MoodMidpoint	Cohen's d	12.84953%	-1.059	-1.268	-.849
		Hedges' correction	12.88510%	-1.057	-1.264	-.846

a. The denominator used in estimating the effect sizes.

Cohen's d uses the sample standard deviation of the mean difference.

Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Cronbach's Alpha: Self-esteem

Case Processing Summary

		N	%
Cases	Valid	137	100.0
	Excluded[a]	0	.0
	Total	137	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items

.415	3

Cronbach's Alpha: Belonging

Case Processing Summary

		N	%
Cases	Valid	137	100.0
	Excluded[a]	0	.0
	Total	137	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.669	3

Cronbach's Alpha: Control

Case Processing Summary

		N	%
Cases	Valid	137	100.0
	Excluded[a]	0	.0
	Total	137	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.451	3

Cronbach's Alpha: Meaningful

Case Processing Summary

		N	%
Cases	Valid	137	100.0
	Excluded[a]	0	.0
	Total	137	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha[a]	N of Items
-.064	2

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Cronbach's Alpha: Mood

Case Processing Summary

		N	%
Cases	Valid	137	100.0
	Excluded[a]	0	.0
	Total	137	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.651	4

Heart Rate Variability

T-Test: HRV and HR index comparison between baseline & exclusion gameplay

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	BL-MEANHR	83.35694530676443	83	10.078271991087504	1.106234067076543
	ExclMEANHR	82.1627	83	9.50798	1.04364
Pair 2	baselineRMSSDln	3.7522	83	.55196	.06059
	lnExcluRMSSD	3.8534	83	.53839	.05910
Pair 3	baselineHFln	6.0567	83	1.01540	.11145
	lnExclHFabs	6.2673	83	.95552	.10488
Pair 4	baselineLFHFln	1.2432	83	1.10607	.12141
	lnExclLFHF	1.1779	83	1.00937	.11079

Paired Samples Correlations

		N	Correlation	Significance	
				One-Sided p	Two-Sided p
Pair 1	BL-MEANHR & ExclMEANHR	83	.856	<.001	<.001
Pair 2	baselineRMSSDln & lnExcluRMSSD	83	.844	<.001	<.001
Pair 3	baselineHFln & lnExclHFabs	83	.692	<.001	<.001

Pair 4	baselineLFHFln & lnExclLFHF	83	.708	<.001	<.001

Paired Samples Test

		Paired Differences					t	df	One-S
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	BL-MEANHR - ExclMEANHR	1.194258602448514	5.278791638427098	.579422657831715	.041602356798735	2.346914848098292	2.061	82	
Pair 2	baselineRMSSDln - lnExcluRMSSD	-.10114	.30457	.03343	-.16764	-.03463	-3.025	82	
Pair 3	baselineHFln - lnExclHFabs	-.21065	.77498	.08507	-.37987	-.04143	-2.476	82	
Pair 4	baselineLFHFln - lnExclLFHF	.06530	.81337	.08928	-.11230	.24291	.731	82	

Paired Samples Effect Sizes

			Standardizer[a]	Point Estimate	95% Confidence Interval	
					Lower	Upper
Pair 1	BL-MEANHR - ExclMEANHR	Cohen's d	5.278791638427098	.226	.008	.443
		Hedges' correction	5.303086774931082	.225	.008	.441
Pair 2	baselineRMSSDln - lnExcluRMSSD	Cohen's d	.30457	-.332	-.552	-.110
		Hedges' correction	.30597	-.331	-.550	-.110
Pair 3	baselineHFln - lnExclHFabs	Cohen's d	.77498	-.272	-.490	-.052

		Hedges' correction	.77855	-.271	-.488	-.052
Pair 4	baselineLFHFln - lnExclLFHF	Cohen's d	.81337	.080	-.135	.296
		Hedges' correction	.81712	.080	-.135	.294

a. The denominator used in estimating the effect sizes.

Cohen's d uses the sample standard deviation of the mean difference.

Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Positive and Negative Affect Schedule - Extended Analyses

Independent Samples T-Test

Independent Samples T-Test

	t	df	p	Cohen's d
GNA	-0.294	135	0.769	-0.050
Hostility	-0.746	135	0.457	-0.128
GPA	-1.355	135	0.178	-0.232
SelfAssurance	-1.788	135	0.076	-0.306

Note. Student's t-test.

Assumption Checks

Test of Equality of Variances (Levene's)

	F	df	p
GNA	0.884	1	0.349
Hostility	0.070	1	0.792
GPA	0.120	1	0.730
SelfAssurance	1.160	1	0.283

Descriptives

Group Descriptives

	Group	N	Mean	SD	SE
GNA	Articulation	65	8.031	5.582	0.692
	Venting	72	8.306	5.344	0.630
Hostility	Articulation	65	4.862	4.027	0.499
	Venting	72	5.389	4.221	0.497
GPA	Articulation	65	7.446	6.047	0.750
	Venting	72	8.917	6.599	0.778
SelfAssurance	Articulation	65	4.785	3.281	0.407
	Venting	72	5.903	3.962	0.467

Correlations

Correlations

		GNA	Hostility	GPA	SelfAssurance
GNA	Pearson Correlation	1	.737**	-.065	.124
	Sig. (2-tailed)		<.001	.453	.150
	N	137	137	137	137
Hostility	Pearson Correlation	.737**	1	-.161	.192*

	Sig. (2-tailed)	<.001		.060	.025
	N	137	137	137	137
GPA	Pearson Correlation	-.065	-.161	1	.669**
	Sig. (2-tailed)	.453	.060		<.001
	N	137	137	137	137
SelfAssurance	Pearson Correlation	.124	.192*	.669**	1
	Sig. (2-tailed)	.150	.025	<.001	
	N	137	137	137	137

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Heart Rate Variability Descriptive Statistics

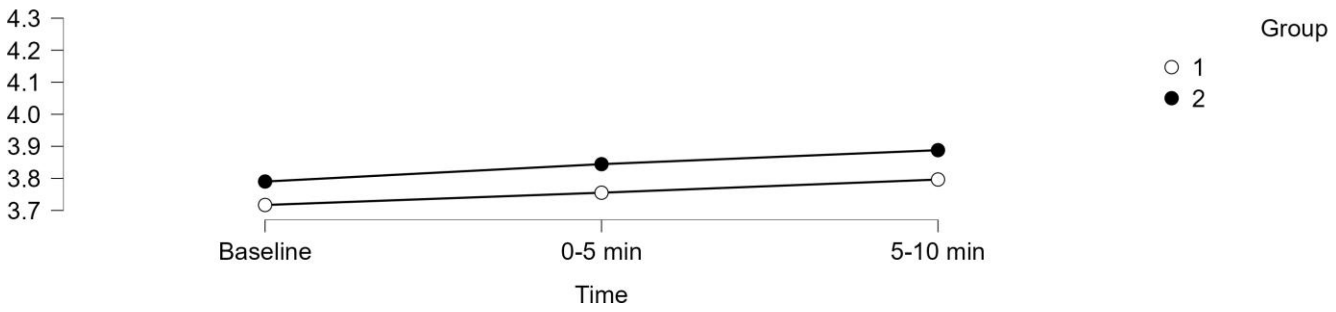
rMSSD

Descriptives

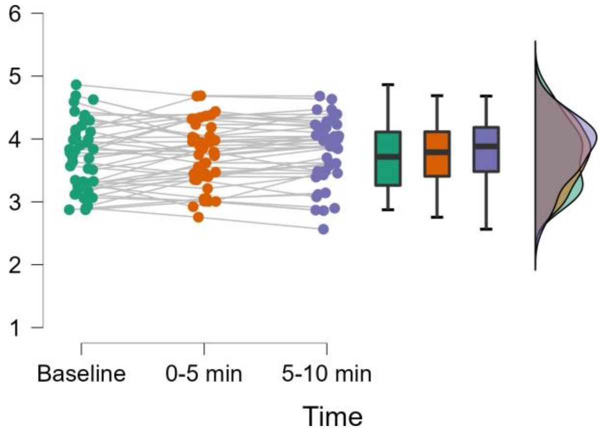
Time	Group	Mean	SD	N	Lower	Upper
Baseline	1	3.717	0.546	43	3.549	3.885
	2	3.790	0.563	40	3.610	3.970
0-5 min	1	3.755	0.505	43	3.600	3.911
	2	3.844	0.542	40	3.671	4.018
5-10 min	1	3.796	0.511	43	3.639	3.954

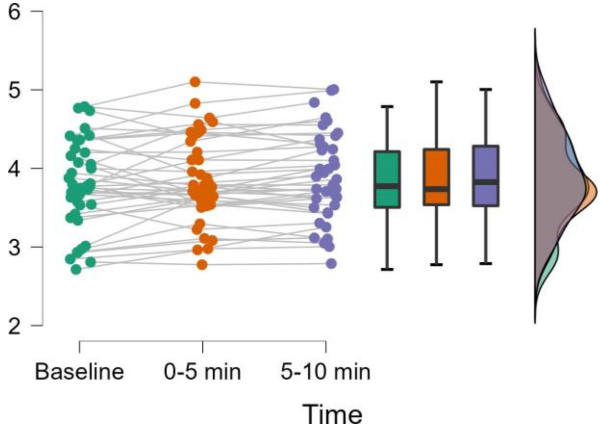
2	3.888	0.557	40	3.710	4.066

Descriptives Plots



Raincloud Plots



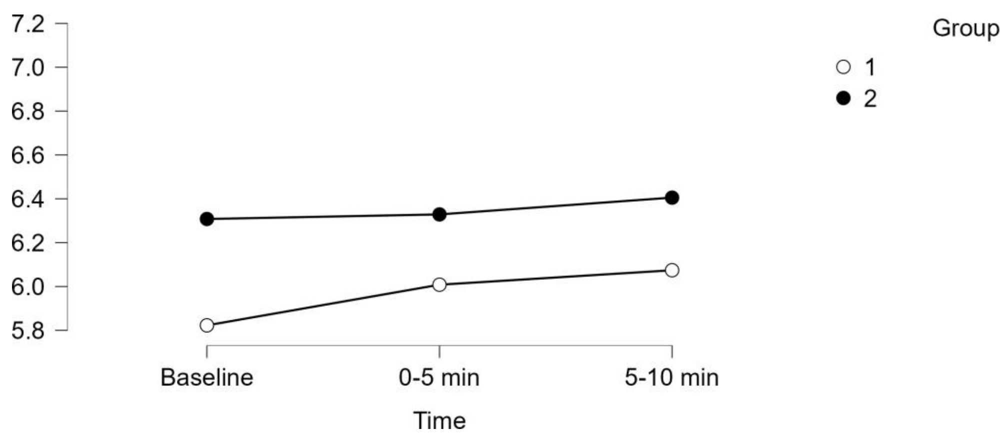


HF HRV

Descriptives

Time	Group	Mean	SD	N	Lower	Upper
Baseline	1	5.823	1.017	43	5.510	6.136
	2	6.308	0.963	40	6.000	6.616
0-5 min	1	6.008	0.969	43	5.710	6.306
	2	6.329	0.829	40	6.064	6.594
5-10 min	1	6.074	1.026	43	5.758	6.390
	2	6.405	0.781	40	6.156	6.655

Descriptives Plots



Raincloud Plots

Group: 1

Group: 2

LF:HF HRV

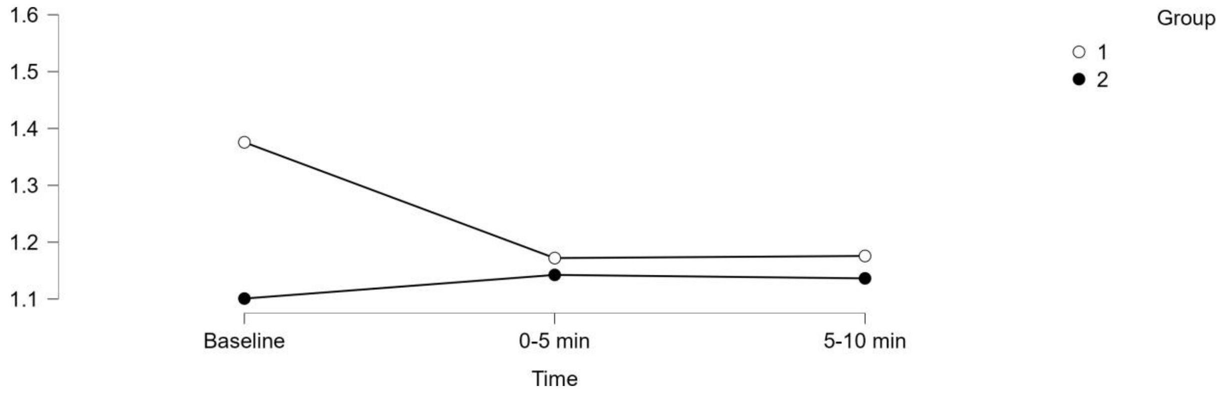
Descriptives

Time	Group	Mean	SD	N	Lower	Upper
Baseline	1	1.376	1.157	43	1.020	1.732
	2	1.101	1.044	40	0.767	1.435
0-5 min	1	1.172	0.980	43	0.871	1.474
	2	1.142	0.651	40	0.934	1.351
5-10 min	1	1.176	1.003	43	0.867	1.485
	2	1.136	0.836	40	0.869	1.404

10

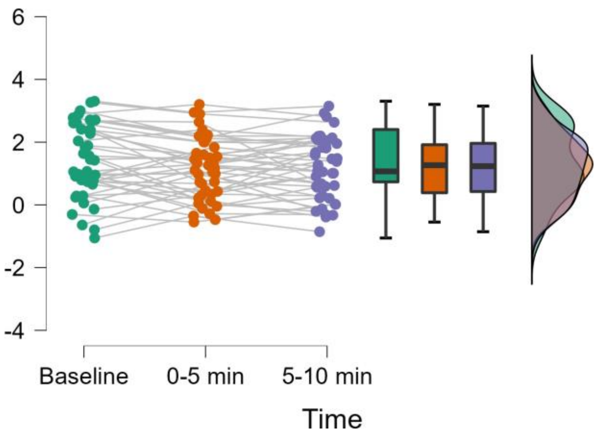
10

Descriptives Plots

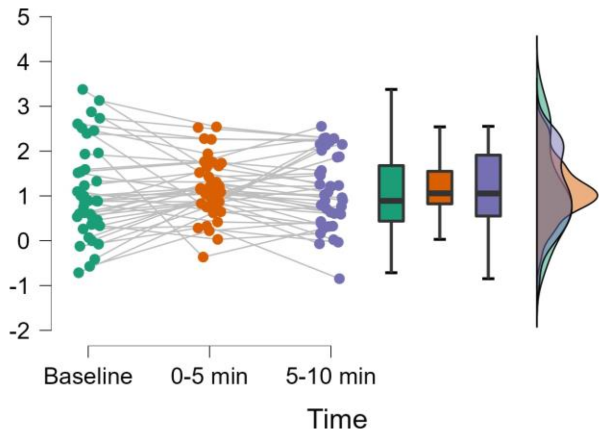


Raincloud Plots

Group: 1



Group: 2

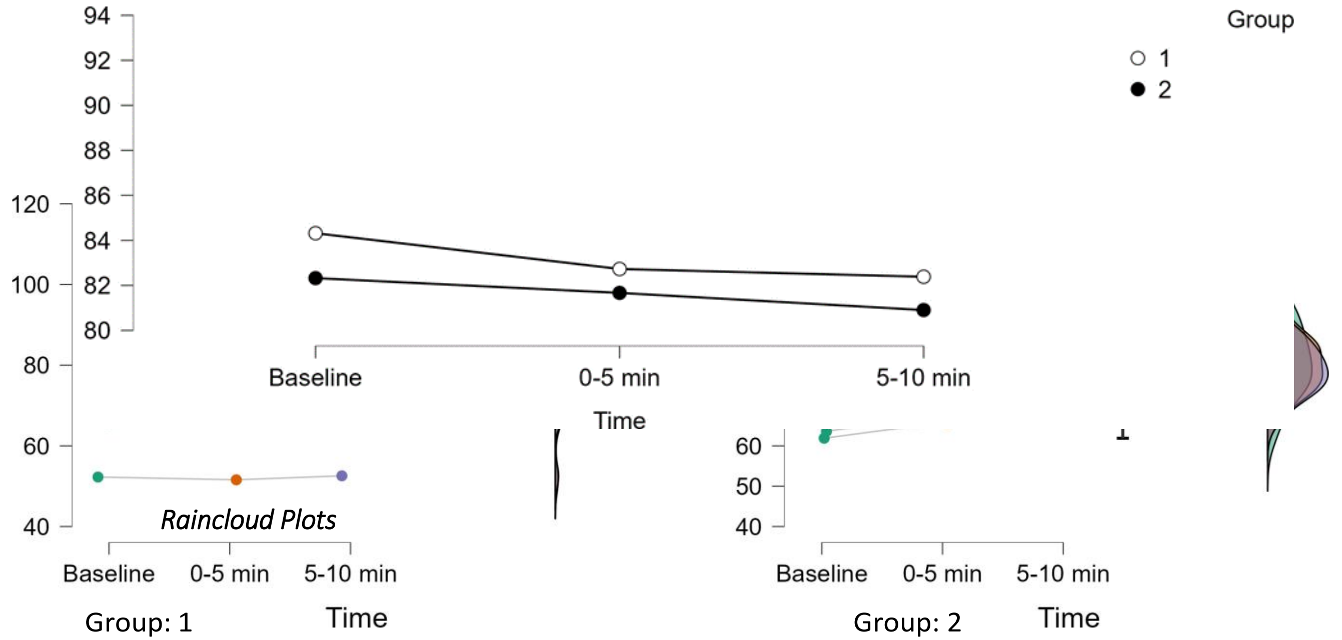


HR

Descriptives

Time	Group	Mean	SD	N	Lower	Upper
Baseline	1	84.318	10.041	43	81.228	87.408
	2	82.324	10.143	40	79.080	85.567
0-5 min	1	82.729	9.156	43	79.912	85.547
	2	81.666	8.641	40	78.903	84.430
5-10 min	1	82.384	8.670	43	79.716	85.053
	2	80.905	8.470	40	78.196	83.614

Descriptives Plots



Sample Characteristics

Toronto Alexithymia Scale – 20-items

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
TAS20	Venting	52	54.6346	12.08147	1.67540
	Articulation	46	52.0652	9.96751	1.46963

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					
						Significance			Std
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Diff
TAS20	Equal variances assumed	2.035	.157	1.139	96	.129	.257	2.56940	
	Equal variances not assumed			1.153	95.559	.126	.252	2.56940	

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
TAS20	Cohen's d	11.14061	.231	-.168	.628
	Hedges' correction	11.22860	.229	-.167	.623
	Glass's delta	9.96751	.258	-.144	.657

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.
Hedges' correction uses the pooled standard deviation, plus a correction factor.
Glass's delta uses the sample standard deviation of the control group.

Difficulties in Emotion Regulation

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
DERS	Venting	52	94.3846	24.90622	3.45387
	Articulation	46	92.0870	25.41113	3.74667

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					
						Significance			Std
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Diffe
DERS	Equal variances assumed	.234	.629	.451	96	.326	.653	2.29766	
	Equal variances not assumed			.451	94.050	.327	.653	2.29766	

Independent Samples Effect Sizes

Standardizer[a]	Point Estimate	95% Confidence Interval

				Lower	Upper
DERS	Cohen's d	25.14416	.091	-.306	.488
	Hedges' correction	25.34275	.091	-.303	.484
	Glass's delta	25.41113	.090	-.307	.487

a. The denominator used in estimating the effect sizes.

Cohen's d uses the pooled standard deviation.

Hedges' correction uses the pooled standard deviation, plus a correction factor.

Glass's delta uses the sample standard deviation of the control group.

COPE Inventory – Focus On and Venting of Emotions Subscale

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
VENT	Venting	52	10.5769	3.54438	.49152
	Articulation	46	10.6522	3.47830	.51285

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means					
						Significance			Std.
		F	Sig.	t	df	One-Sided p	Two-Sided p	Mean Difference	Diffe
VENT	Equal variances assumed	.003	.956	-.106	96	.458	.916	-.07525	
	Equal variances not assumed			-.106	94.950	.458	.916	-.07525	

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
VENT	Cohen's d	3.51356	-.021	-.418	.375
	Hedges' correction	3.54131	-.021	-.415	.372
	Glass's delta	3.47830	-.022	-.418	.375

a. The denominator used in estimating the effect sizes.

Cohen's d uses the pooled standard deviation.

Hedges' correction uses the pooled standard deviation, plus a correction factor.

Glass's delta uses the sample standard deviation of the control group.

Appendix Q – Inferential Statistics for Study Three

Code

```
# title: "PANAS-XD Confirmatory Factor Analysis Script"
# author: "Olly Robertson"

# R version 4.0.3 (2020-10-10) -- "Bunny-Wunnies Freak Out"
# Platform: x86_64-w64-mingw32/x64 (64-bit)

# This code completes the following functions:
# 1. Analyse descriptive statistics and assess gender differences in
responding.
# 2. Compute BFI subscales
# 3. Specify PANAS-XD subscales
# 4. Test one-, two-, and three-factor solutions using CFA, including
reliability checks for two-factor solution
# 5. Run correlational analyses between all variables of interest

# N.B. This code assumes the data is already imported into the environment.
# PANAS_XD <- Raw PANAS-XD data
# PANAS_XD_Outliers_Removed <- Cleaned PANAS-XD data

## Load packages
library("psych")
library("car")
library("dplyr")
library("corrplot")
library("lavaan")
```

```
library("semTools")
library("knitr")
library("semPlot")
library("tidySEM")
library("equaltestMI")
library("ggplot2")

## Analyse descriptive statistics
descripStats <- describe(PANAS_XD)

## Cronbach's Alpha
gnaScale <- PANAS_XD %>%
  select(Angstig, Bang, Nerveus, Gejaagd, Schuldig, Beschaamd, Geïrriteerd,
Vijandig,
         Overstuur, Diep_ongelukkig)
gnaAlpha <- alpha(gnaScale)

fearScale <- PANAS_XD %>%
  select(Angstig, Bang, Verschrikt, Nerveus, Gejaagd, Onzeker)
fearAlpha <- alpha(fearScale)

hostilityScale  <- PANAS_XD %>%
  select(Boos, Geïrriteerd, Vijandig, Minachtend, Walging, Minachting)
hostilityAlpha <- alpha(hostilityScale)

guiltScale <- PANAS_XD %>%
```

```
  select(Schuldig, Beschaamd, Afkeurenswaardig, Boos_op_mezelf,
Walg_van_mijzelf, Ontevreden_over_mezelf)
guiltAlpha <- alpha(guiltScale)

sadnessScale <- PANAS_XD %>%
  select(Verdrietig, Truerig, Neergeslagen, Alleen, Eenzaam)
sadnessAlpha <- alpha(sadnessScale)

shynessScale <- PANAS_XD %>%
  select(Verlegen, Bedeesd, Schaapachtig, Timide)
shynessAlpha <- alpha(shynessScale)

fatigueScale <- PANAS_XD %>%
  select(Slaperig, Moe, Traag, Soezerig)
fatigueAlpha <- alpha(fatigueScale)

gpaScale <- PANAS_XD %>%
  select(Actief, Alert, Oplettend, Enthousiast, Opgewekt, Geïnspireerd,
Geïnteresseerd,
         Trors, Sterk, Vastberaden)
gpaAlpha <- alpha(gpaScale)

jovialityScale <- PANAS_XD %>%
  select(Opgewekt, Blij, Vrolijk, Verheugd, Enthousiast, Opgewekt, Levendig,
Energiek)
jovialityAlpha <- alpha(jovialityScale)
```

```
selfAssuranceScale <- PANAS_XD %>%
  select(Trors, Sterk, Zelfverzekerd, Brutaal, Onbevreesd, Gedurfd)
selfassuranceAlpha <- alpha(selfAssuranceScale)

attentivenessScale <- PANAS_XD %>%
  select(Alert, Oplettend, Geconcentreerd, Vastberaden)
attentivenessAlpha <- alpha(attentivenessScale)

serenityScale <- PANAS_XD %>%
  select(Kalm, Ontspannen, Op_mjn_gemak)
serenityAlpha <- alpha(serenityScale)

surpriseScale <- PANAS_XD %>%
  select(Verrast, Versteld_staan, Verwonderd)
surpriseAlpha <- alpha(surpriseScale)

## T-Tests assessing gender differences
# N.B. Non-binary participants excluded from this analysis due to small
sample (n=2).

# Rename ‘F’ to ‘Fear’ to avoid Errors
PANAS_XD <- PANAS_XD %>%
  Rename(Fear = “F”)
# Remove non-binary participants here.
PANAS_XD$Gender <- sjlabelled::set_labels(
  PANAS_XD$Gender,
  labels = c(
```

```
    `1` = "Male",
    `2` = "Female",
    `3` = "Non-Binary"
  )
)

PANAS_XD_Outliers_Gender <- PANAS_XD

PANAS_XD_Gender <- PANAS_XD[!grepl("Non-Binary", PANAS_XD$Gender),] # Remove
non-binary participants here

# Assess data for homogeneity of variance.
gnaLevene <- leveneTest(PANAS_XD_Gender$GNA, PANAS_XD_Gender$Gender) #
Levene’s Test for Equality of Variances (p>.05) for all subscales

gna <- PANAS_XD_Gender %>%
  t_test(GNA ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()

fear <- PANAS_XD_Gender %>%
t_test(Fear ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()

sadness <- PANAS_XD_Gender %>%
  t_test(S ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()
```

```
guilt <- PANAS_XD_Gender %>%
  t_test(G ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()

hostility <- PANAS_XD_Gender %>%
  t_test(Ho ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()

shyness <- PANAS_XD_Gender %>%
  t_test(Shy ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()

fatigue <- PANAS_XD_Gender %>%
  t_test(Fat ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()

gpa <- PANAS_XD_Gender %>%
  t_test(GPA ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()

joviality <- PANAS_XD_Gender %>%
  t_test(J ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()

selfassurance <- PANAS_XD_Gender %>%
  t_test(SA ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()
```

```
attentiveness <- PANAS_XD_Gender %>%
  t_test(Att ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()

serenity <- PANAS_XD_Gender %>%
  t_test(Ser ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()

surprise <- PANAS_XD_Gender %>%
  t_test(Sup ~ Gender, detailed = TRUE, var.equal = T) %>%
  add_significance()



gender_ttest <- bind_rows(
  gna, fear, sadness, guilt, hostility, fatigue, shyness, gpa, joviality,
selfassurance,
  attentiveness, serenity, surprise
)

## Compute BFI subscale values
PANAS_XD$Extraversion <- rowSums(PANAS_XD [,c("BFI1", "RBFI6", "BFI11",
"BFI16",
                     "RBFI21", "BFI26", "RBFI31")])
PANAS_XD$Agreeableness <- rowSums(PANAS_XD[,c("RBFI2", "BFI7", "RBFI12",
"BFI17",
                                              "BFI22", "RBFI27", "BFI32")])
```

```
PANAS_XD$Conscientiousness <- rowSums(PANAS_XD[,c("BFI3", "RBFI8", "BFI13",
"RBFI18",
                                              "RBFI23", "BFI28", "BFI33")])
PANAS_XD$Neuroticism <- rowSums(PANAS_XD[,c("BFI2", "RBFI9", "BFI14",
"BFI19",
                                              "RBFI24", "BFI29", "RBFI34")])
PANAS_XD$Openness <- rowSums(PANAS_XD[,c("BFI5", "BFI10", "BFI15", "BFI20",
                                              "BFI25", "BFI30")])

## Specify PANAS-XD subscales
Fear =~ Angstig  + Bang + Verschrikt  + Nerveus + Gejaagd + Onzeker
Hostility  =~ Boos + Geïrriteerd + Vijandig + Minachtend + Walging +
Minachting
Guilt =~ Schuldig + Beschaamd + Afkeurenswaardig + Boos_op_mezelf +
Walg_van_mijzelf + Ontevreden_over_mezelf
Sadness =~ Verdrietig + Treurig + Neergeslagen + Alleen + Eenzaam
Shyness =~ Verlegen + Bedeesd + Schaapachtig + Timide
Fatigue =~ Slaperig + Moe + Traag + Soezerig
Joviality =~ Opgewekt + Blij + Vrolijk + Verheugd + Enthousiast + Opgewekt +
Levendig + Energiek
SelfAssurance =~ Trots + Sterk + Zelfverzekerd + Brutaal + Onbevreesd +
Gedurfd
Attentiveness =~ Alert + Oplettend + Geconcentreerd + Vastberaden
Serenity =~ Kalm + Ontspannen + Op_mijn_gemak
Surprise =~ Verrast + Versteld_staan + Verwonderd
## One-factor Model
one_model <- 'Emotion =~ F + S + Ho + Shy + Fat + J + SA + Att + Ser + Sup'
```

```
oneFit <- cfa(one_model, data = PANAS_XD, estimator = "MLR", test =
"Bollen.Stine", bootstrap = 2000)
oneFit
summary(oneFit, fit.measures=TRUE, standardized = TRUE, rsquare = TRUE)
standardizedSolution(oneFit)
mods <- modindices(oneFit)
graph_sem(model = oneFit, layout_algorithm = "layout_on_grid ")

## Two-factor Model
twoFit <- cfa(two_model, data = PANAS_XD, estimator = "MLR", test =
"Bollen.Stine", bootstrap = 2000)
twoFit
summary(twoFit, fit.measures=TRUE, standardized = TRUE, rsquare = TRUE)
standardizedSolution(twoFit)
mods <- modindices(twoFit)
graph_sem(model = twoFit, layout_algorithm = "layout_on_grid")

## Three-factor Model
three_model <- 'NegAff=~ F + S + G + Ho
PosAff =~ J + SA + Att
OthAff =~ Shy + Fat + Ser + Sup'

threeFit <- cfa(three_model, data = PANAS_XD_Outliers_Removed, estimator =
"MLR", test = "Bollen.Stine", bootstrap = 2000)
threeFit
summary(threeFit, fit.measures=TRUE, standardized = TRUE, rsquare = TRUE)
standardizedSolution(threeFit)
```

```
mods <- modindices(threeFit)
graph_sem(model = threeFit, layout_algorithm = "layout_as_grid ")


## Two-Factor Model Reliability
install.packages("remotes")
remotes::install_github("jsaraviadrago/bluegrafi")
library(bluegrafir)

comp_reliability(twoFit)


condisc <- function(x){
  std.loadings<- inspect(x, what="std")$lambda
  #std.loadings
  std.loadings[std.loadings==0] <- NA
  #std.loadings
  std.loadings <- std.loadings^2
  #std.loadings
  ave <- colMeans(std.loadings, na.rm=TRUE)
  #ave
  #factor correlation matrix
  fcor <- lavInspect(x, "cor.lv")
  #fcor
  sqfcor <- fcor^2
  #sqfcor
  list(Squared_Factor_Correlation=round(sqfcor, digits=3),
```

```
       Average_Variance_Extracted=round(ave, digits=3))
}

condisc(twoFit)

## Correlational Analyses
PANAS_Scales <- PANAS_XD %>%
  select(Fear, S, G, Ho, J, SA, Att, Shy, Fat, Ser, Sup)

corScales <- PANAS_XD %>%
  select(GNA, Fear, S, G, Ho, GPA, J, SA, Att, Shy, Fat, Ser, Sup,
Extraversion,
         Openness, Agreeableness, Neuroticism, Conscientiousness) %>%
  rename(
    "Sadness" = S,
    "Guilt" = G,
    "Hostility" = Ho,
    "Joviality" = J,
    "Self-Assurance" = SA,
    "Attentiveness" = Att,
    "Shyness" = Shy,
    "Fatigue" = Fat,
    "Serenity" = Ser,
    "Surprise" = Sup
  )

M <- cor(corScales)
```

```
corrplot(M, type="upper", method="circle")
```

Descriptive Statistics

Column1	n	mean	sd	median	trimmed	mad	min	max	range	skew	kurtosis	se
Gender*	120	1.383333	0.521525	1	1.33333333	0	1	3	2	0.82358	-0.592002	0.04760
Age	120	27.20833	7.57694	25	26.28125	5.9304	18	49	31	0.992356	0.2791932	0.69167
Ethnicity	120	1.383333	1.427128	1	1	0	1	9	8	3.768744	13.361059	0.13027
GNA	120	15.74167	7.190675	13	14.3125	4.4478	10	45	35	1.846551	3.3792762	0.65641
Fear	120	10.28333	4.728216	9	9.46875	4.4478	6	29	23	1.631596	3.0133113	0.43162
Sadness	120	9.108333	4.458578	8	8.33333333	4.4478	5	25	20	1.384947	1.5409268	0.40701
Guilt	120	9.425	4.894968	7.5	8.34375	2.2239	6	29	23	2.054815	4.162236	0.44684
Hostility	120	8.25	3.079479	7	7.63541667	1.4826	6	21	15	1.648144	2.5520922	0.28111
Shyness	120	7.733333	2.806755	7	7.5	2.9652	4	16	12	0.694311	0.0425074	0.2562
Fatigue	120	9.858333	3.517772	9	9.76041667	4.4478	4	18	14	0.209655	-0.74651	0.32112
Joviality	120	22.25833	7.445596	22.5	22.2604167	8.1543	8	37	29	0.01438	-0.784336	0.67968
Self-Assurance	120	14.35833	4.71685	14	14.2604167	5.9304	6	27	21	0.213394	-0.632988	0.43058
Attentiveness	120	12.76667	3.387405	13	12.8854167	2.9652	4	20	16	-0.33974	-0.309157	0.30922
Serenity	120	10.50833	2.653667	11	10.6770833	1.4826	4	15	11	-0.57112	-0.240343	0.24224
Surprise	120	4.841667	2.153738	4	4.46875	1.4826	3	12	9	1.309331	1.1789767	0.19660
GPA	120	27.93333	7.963924	27.5	27.8541667	8.1543	10	48	38	0.076544	-0.468952	0.72700
Extraversion	120	21.98333	4.92973	22	22.1041667	4.4478	8	32	24	-0.26345	-0.303998	0.45002
Agreeableness	120	24.25	4.069253	24	24.4166667	4.4478	13	32	19	-0.36258	-0.274736	0.3714
Conscientiousness	120	23.85	3.963383	24	24	4.4478	13	32	19	-0.34191	-0.13713	0.36180
Neuroticism	120	22.58333	4.385966	23	22.625	4.4478	12	34	22	-0.08473	-0.416206	0.40038
Openness	120	22.35	3.652212	22	22.4583333	2.9652	13	30	17	-0.21927	-0.361916	0.333

Gender Differences

Levene's Test

Scale	Df	F value	Pr(>F)
GNA	1	1.760753	0.187137
GNA	116	NA	NA
Fear	1	0.463135	0.497519
Fear	116	NA	NA
Sadness	1	0.327081	0.56849
Sadness	116	NA	NA
Guilt	1	0.168722	0.682008
Guilt	116	NA	NA
Hostility	1	0.382133	0.537676
Hostility	116	NA	NA
Fatigue	1	1.031307	0.311965
Fatigue	116	NA	NA
Shyness	1	0.005554	0.940718
Shyness	116	NA	NA
GPA	1	0.299346	0.585344
GPA	116	NA	NA
Joviality	1	0.011349	0.915344
Joviality	116	NA	NA
Self-Assurance	1	0.008753	0.925624

Self-Assurance	116	NA	NA
Attentiveness	1	0.201864	0.654059
Attentiveness	116	NA	NA
Serenity	1	0.013453	0.907862
Serenity	116	NA	NA
Surprise	1	0.392676	0.532128
Surprise	116	NA	NA

T-tests

Subscale	estimate	estimate1	estimate2	group1	group2	n1	n2	statistic	p	df	conf.low	conf.high	p.si
GNA	-2.3884712	14.92105263	17.30952381	Male	Female	76	42	-1.729519	0.0864	116	-5.1237215	0.3467791	ns
Fear	-1.5833333	9.75	11.33333333	Male	Female	76	42	-1.745616	0.0835	116	-3.3798288	0.2131621	ns
Sadness	-0.9536341	8.736842105	9.69047619	Male	Female	76	42	-1.107702	0.27	116	-2.6587783	0.7515101	ns
Guilt	-0.4830827	9.302631579	9.785714286	Male	Female	76	42	-0.508943	0.612	116	-2.3630681	1.39690265	ns
Hostility	-0.5162907	8.078947368	8.595238095	Male	Female	76	42	-0.864318	0.389	116	-1.6993957	0.66681427	ns
Fatigue	-0.1359649	9.697368421	9.833333333	Male	Female	76	42	-0.204886	0.838	116	-1.4503332	1.1784034	ns
Shyness	0.51629073	7.921052632	7.404761905	Male	Female	76	42	0.9485388	0.345	116	-0.5617662	1.59434766	ns
GPA	2.47619048	29	26.52380952	Male	Female	76	42	1.6426469	0.103	116	-0.509483	5.46186396	ns
Joviality	1.2387218	22.88157895	21.64285714	Male	Female	76	42	0.8736992	0.384	116	-1.5693896	4.04683317	ns
Self-Assurance	1.71929825	15.05263158	13.33333333	Male	Female	76	42	1.9234586	0.0569	116	-0.0510995	3.48969599	ns
Atteentiveness	1.04385965	13.21052632	12.16666667	Male	Female	76	42	1.6252359	0.107	116	-0.2282607	2.31597996	ns
Serenity	1.28571429	11	9.714285714	Male	Female	76	42	2.5712699	0.0114	116	0.29534015	2.27608842	*
Surprise	0.13533835	4.921052632	4.785714286	Male	Female	76	42	0.3248646	0.746	116	-0.689789	0.96046566	ns

Confirmatory Factor Analysis

One-Factor Model

```
> summary(oneFit, fit.measures=TRUE, standardized = TRUE, rsquare = TRUE)

lavaan 0.6-8 ended normally after 56 iterations

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of model parameters                        20

  Number of observations                           120

Model Test User Model:
                                              Standard      Robust
  Test Statistic                               359.287     306.024
  Degrees of freedom                                35          35
  P-value (Chi-square)                           0.000       0.000
  Scaling correction factor                                  1.174
       Yuan-Bentler correction (Mplus variant)

Model Test Baseline Model:

  Test statistic                               677.709     573.315
  Degrees of freedom                                45          45
  P-value                                        0.000       0.000
```

```
  Scaling correction factor                                  1.182

User Model versus Baseline Model:

  Comparative Fit Index (CFI)                      0.487       0.487
  Tucker-Lewis Index (TLI)                         0.341       0.340

  Robust Comparative Fit Index (CFI)                           0.490
  Robust Tucker-Lewis Index (TLI)                              0.345

Loglikelihood and Information Criteria:

  Loglikelihood user model (H0)                -3096.691   -3096.691
  Scaling correction factor                                    1.261
      for the MLR correction
  Loglikelihood unrestricted model (H1)        -2917.047   -2917.047
  Scaling correction factor                                    1.205
      for the MLR correction

  Akaike (AIC)                                  6233.382    6233.382
  Bayesian (BIC)                                6289.131    6289.131
  Sample-size adjusted Bayesian (BIC)           6225.901    6225.901

Root Mean Square Error of Approximation:
```

```
  RMSEA                                          0.278       0.254
  90 Percent confidence interval - lower         0.252       0.230
  90 Percent confidence interval - upper         0.304       0.279
  P-value RMSEA <= 0.05                          0.000       0.000

  Robust RMSEA                                               0.275
  90 Percent confidence interval - lower                     0.247
  90 Percent confidence interval - upper                     0.304

Standardized Root Mean Square Residual:

  SRMR                                           0.241       0.241

Parameter Estimates:

  Standard errors                             Sandwich
  Information bread                           Observed
  Observed information based on                Hessian

Latent Variables:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  Emotion =~
    Fear              1.000                               1.317    0.280
```

S	1.463	0.362	4.042	0.000	1.928	0.434
Ho	0.355	0.161	2.200	0.028	0.468	0.153
Shy	0.307	0.184	1.673	0.094	0.405	0.145
Fat	1.023	0.341	2.999	0.003	1.348	0.385
J	-5.315	2.228	-2.385	0.017	-7.002	-0.944
SA	-3.029	1.305	-2.321	0.020	-3.990	-0.850
Att	-1.823	0.824	-2.214	0.027	-2.402	-0.712
Ser	-1.193	0.443	-2.694	0.007	-1.571	-0.595
Sup	-0.625	0.371	-1.686	0.092	-0.823	-0.384

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
.Fear	20.434	4.074	5.015	0.000	20.434	0.922
.S	15.997	2.756	5.805	0.000	15.997	0.811
.Ho	9.185	1.768	5.194	0.000	9.185	0.977
.Shy	7.648	0.982	7.786	0.000	7.648	0.979
.Fat	10.454	1.258	8.308	0.000	10.454	0.852
.J	5.949	2.678	2.222	0.026	5.949	0.108
.SA	6.141	1.020	6.022	0.000	6.141	0.278
.Att	5.609	0.752	7.457	0.000	5.609	0.493
.Ser	4.515	0.732	6.166	0.000	4.515	0.647
.Sup	3.922	0.717	5.471	0.000	3.922	0.853
Emotion	1.735	1.404	1.236	0.217	1.000	1.000

```
R-Square:
                   Estimate
    Fear              0.078
    S                 0.189
    Ho                0.023
    Shy               0.021
    Fat               0.148
    J                 0.892
    SA                0.722
    Att               0.507
    Ser               0.353
    Sup               0.147
```

Two-Factor Model

```
> summary(twoFit, fit.measures=TRUE, standardized = TRUE, rsquare = TRUE)
lavaan 0.6-8 ended normally after 81 iterations

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of model parameters                        23

  Number of observations                           120
```

```
Model Test User Model:

                                              Standard      Robust

  Test Statistic                               164.062     144.661

  Degrees of freedom                                43          43

  P-value (Chi-square)                           0.000       0.000

  Scaling correction factor                                  1.134

       Yuan-Bentler correction (Mplus variant)


Model Test Baseline Model:


  Test statistic                              823.716     714.177

  Degrees of freedom                               55          55

  P-value                                       0.000       0.000

  Scaling correction factor                                 1.153


User Model versus Baseline Model:


  Comparative Fit Index (CFI)                   0.843       0.846

  Tucker-Lewis Index (TLI)                      0.799       0.803


  Robust Comparative Fit Index (CFI)                        0.848

  Robust Tucker-Lewis Index (TLI)                           0.806


Loglikelihood and Information Criteria:
```

```
  Loglikelihood user model (H0)             -3286.430   -3286.430
  Scaling correction factor                                 1.344
      for the MLR correction
  Loglikelihood unrestricted model (H1)     -3204.399   -3204.399
  Scaling correction factor                                 1.207
      for the MLR correction

  Akaike (AIC)                               6618.861    6618.861
  Bayesian (BIC)                             6682.973    6682.973
  Sample-size adjusted Bayesian (BIC)        6610.258    6610.258

Root Mean Square Error of Approximation:

  RMSEA                                         0.153       0.140
  90 Percent confidence interval - lower        0.129       0.117
  90 Percent confidence interval - upper        0.178       0.164
  P-value RMSEA <= 0.05                         0.000       0.000

  Robust RMSEA                                              0.149
  90 Percent confidence interval - lower                    0.123
  90 Percent confidence interval - upper                    0.177

Standardized Root Mean Square Residual:
```

```
  SRMR                                           0.158       0.158

Parameter Estimates:

  Standard errors                             Sandwich
  Information bread                           Observed
  Observed information based on                Hessian

Latent Variables:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  NegAff =~
    Fear              1.000                               4.323    0.918
    S                 0.850    0.063   13.484    0.000    3.673    0.827
    G                 0.974    0.088   11.048    0.000    4.213    0.864
    Ho                0.483    0.090    5.350    0.000    2.089    0.681
    Shy               0.372    0.047    7.917    0.000    1.607    0.575
    Fat               0.422    0.048    8.867    0.000    1.825    0.521
  PosAff =~
    J                 1.000                               6.853    0.924
    SA                0.602    0.048   12.500    0.000    4.128    0.879
    Att               0.362    0.041    8.792    0.000    2.483    0.736
    Ser               0.217    0.037    5.912    0.000    1.490    0.564
    Sup               0.134    0.030    4.491    0.000    0.920    0.429
```

Covariances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
NegAff ~~						
PosAff	-9.029	3.001	-3.009	0.003	-0.305	-0.305

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
.Fear	3.479	1.036	3.357	0.001	3.479	0.157
.S	6.221	1.547	4.022	0.000	6.221	0.316
.G	6.015	1.416	4.247	0.000	6.015	0.253
.Ho	5.041	0.879	5.732	0.000	5.041	0.536
.Shy	5.230	0.826	6.331	0.000	5.230	0.670
.Fat	8.941	1.078	8.293	0.000	8.941	0.729
.J	8.018	3.436	2.334	0.020	8.018	0.146
.SA	5.023	1.137	4.417	0.000	5.023	0.228
.Att	5.213	0.732	7.123	0.000	5.213	0.458
.Ser	4.764	0.738	6.457	0.000	4.764	0.682
.Sup	3.753	0.689	5.450	0.000	3.753	0.816
NegAff	18.691	4.669	4.004	0.000	1.000	1.000
PosAff	46.957	5.989	7.840	0.000	1.000	1.000

R-Square:

	Estimate

```
    Fear              0.843
    S                 0.684
    G                 0.747
    Ho                0.464
    Shy               0.330
    Fat               0.271
    J                 0.854
    SA                0.772
    Att               0.542
    Ser               0.318
    Sup               0.184

> comp_reliability(twoFit)
# A tibble: 2 x 2
  lhs    composite_reliability_ec
  <chr>                     <dbl>
1 NegAff                    0.750
2 PosAff                    0.758
> condisc(twoFit)
$Squared_Factor_Correlation
       NegAff PosAff
NegAff 1.000
PosAff 0.093  1.000
```

```
$Average_Variance_Extracted
NegAff PosAff
 0.557  0.534
```

Three-Factor Model

```
> summary(threeFit, fit.measures=TRUE, standardized = TRUE, rsquare = TRUE)
lavaan 0.6-8 ended normally after 117 iterations

  Estimator                                         ML
  Optimization method                           NLMINB
  Number of model parameters                        25

  Number of observations                           120

Model Test User Model:
                                              Standard      Robust
  Test Statistic                               158.730     151.873
  Degrees of freedom                                41          41
  P-value (Chi-square)                           0.000       0.000
  Scaling correction factor                                  1.045
       Yuan-Bentler correction (Mplus variant)

Model Test Baseline Model:
```

```
  Test statistic                               823.716     714.177
  Degrees of freedom                                55          55
  P-value                                        0.000       0.000
  Scaling correction factor                                  1.153

User Model versus Baseline Model:

  Comparative Fit Index (CFI)                    0.847       0.832
  Tucker-Lewis Index (TLI)                       0.795       0.774

  Robust Comparative Fit Index (CFI)                         0.848
  Robust Tucker-Lewis Index (TLI)                            0.796

Loglikelihood and Information Criteria:

  Loglikelihood user model (H0)              -3283.764   -3283.764
  Scaling correction factor                                  1.473
      for the MLR correction
  Loglikelihood unrestricted model (H1)      -3204.399   -3204.399
  Scaling correction factor                                  1.207
      for the MLR correction

  Akaike (AIC)                                6617.529    6617.529
```

```
  Bayesian (BIC)                              6687.216    6687.216
  Sample-size adjusted Bayesian (BIC)         6608.178    6608.178

Root Mean Square Error of Approximation:

  RMSEA                                          0.155       0.150
  90 Percent confidence interval - lower         0.130       0.126
  90 Percent confidence interval - upper         0.180       0.175
  P-value RMSEA <= 0.05                          0.000       0.000

  Robust RMSEA                                               0.153
  90 Percent confidence interval - lower                     0.128
  90 Percent confidence interval - upper                     0.180

Standardized Root Mean Square Residual:

  SRMR                                           0.141       0.141

Parameter Estimates:

  Standard errors                             Sandwich
  Information bread                           Observed
  Observed information based on                Hessian
```

```
Latent Variables:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  NegAff =~
    Fear              1.000                               4.402    0.935
    S                 0.823    0.065   12.607    0.000    3.622    0.816
    G                 0.946    0.095    9.951    0.000    4.165    0.855
    Ho                0.475    0.089    5.359    0.000    2.093    0.683
  PosAff =~
    J                 1.000                               6.938    0.936
    SA                0.587    0.053   11.025    0.000    4.070    0.867
    Att               0.353    0.043    8.191    0.000    2.447    0.725
  OthAff =~
    Shy               1.000                               1.285    0.460
    Fat               1.332    0.300    4.444    0.000    1.711    0.488
    Ser              -1.348    0.400   -3.371    0.001   -1.731   -0.655
    Sup               0.151    0.341    0.444    0.657    0.194    0.091

Covariances:
                   Estimate  Std.Err  z-value  P(>|z|)   Std.lv  Std.all
  NegAff ~~
    PosAff           -8.672    2.966   -2.924    0.003   -0.284   -0.284
    OthAff            5.756    2.330    2.470    0.014    1.018    1.018
  PosAff ~~
    OthAff           -5.927    1.552   -3.819    0.000   -0.665   -0.665
```

Variances:

	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
.Fear	2.790	1.037	2.690	0.007	2.790	0.126
.S	6.596	1.527	4.318	0.000	6.596	0.335
.G	6.411	1.471	4.359	0.000	6.411	0.270
.Ho	5.023	0.870	5.774	0.000	5.023	0.534
.J	6.837	3.676	1.860	0.063	6.837	0.124
.SA	5.495	1.246	4.411	0.000	5.495	0.249
.Att	5.393	0.777	6.939	0.000	5.393	0.474
.Shy	6.162	0.932	6.612	0.000	6.162	0.789
.Fat	9.344	1.278	7.309	0.000	9.344	0.761
.Ser	3.986	0.686	5.808	0.000	3.986	0.571
.Sup	4.562	0.707	6.456	0.000	4.562	0.992
NegAff	19.380	4.764	4.068	0.000	1.000	1.000
PosAff	48.138	6.376	7.550	0.000	1.000	1.000
OthAff	1.650	0.941	1.753	0.080	1.000	1.000

R-Square:

	Estimate
Fear	0.874
S	0.665
G	0.730
Ho	0.466

J	0.876
SA	0.751
Att	0.526
Shy	0.211
Fat	0.239
Ser	0.429
Sup	0.008

Cronbach's Alpha

General Negative Affect – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis
Call: alpha(x = gnaScale)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.92      0.92    0.93      0.53  11 0.011  1.6 0.72     0.54

 lower alpha upper     95% confidence boundaries
0.89 0.92 0.94

 Reliability if an item is dropped:
                raw_alpha std.alpha G6(smc) average_r  S/N alpha se  var.r med.r
Angstig              0.90      0.91    0.91      0.52  9.7    0.013 0.0131  0.53
Bang                 0.90      0.90    0.91      0.51  9.5    0.013 0.0133  0.53
Nerveus              0.91      0.91    0.92      0.53 10.0    0.013 0.0141  0.53
Gejaagd              0.91      0.91    0.92      0.53 10.2    0.012 0.0150  0.55
Schuldig             0.90      0.91    0.92      0.52  9.6    0.013 0.0126  0.51
Beschaamd            0.91      0.91    0.92      0.52  9.9    0.013 0.0119  0.52
Geïrriteerd          0.92      0.92    0.93      0.57 11.8    0.011 0.0062  0.57
Vijandig             0.91      0.91    0.92      0.54 10.4    0.012 0.0140  0.57
Overstuur            0.90      0.90    0.91      0.51  9.5    0.013 0.0135  0.52
Diep_ongelukkig      0.91      0.91    0.92      0.54 10.6    0.012 0.0110  0.55
```

```
 Item statistics
                  n raw.r std.r r.cor r.drop mean   sd
Angstig         120  0.80  0.80  0.79   0.74  1.6 0.95
Bang            120  0.83  0.83  0.82   0.78  1.4 0.82
Nerveus         120  0.78  0.77  0.73   0.71  1.9 1.06
Gejaagd         120  0.76  0.75  0.71   0.68  1.8 1.18
Schuldig        120  0.81  0.82  0.80   0.76  1.5 0.97
Beschaamd       120  0.78  0.78  0.76   0.72  1.4 0.94
Geïrriteerd     120  0.57  0.58  0.52   0.47  1.6 0.91
Vijandig        120  0.71  0.73  0.69   0.65  1.3 0.74
Overstuur       120  0.84  0.84  0.82   0.79  1.5 0.92
Diep_ongelukkig 120  0.71  0.70  0.66   0.63  1.5 0.98

Non missing response frequency for each item
                   1    2    3    4    5 miss
Angstig         0.61 0.25 0.08 0.03 0.03    0
Bang            0.69 0.22 0.06 0.02 0.02    0
Nerveus         0.46 0.30 0.14 0.07 0.03    0
Gejaagd         0.57 0.21 0.07 0.12 0.03    0
Schuldig        0.69 0.19 0.04 0.05 0.03    0
Beschaamd       0.76 0.13 0.04 0.04 0.03    0
Geïrriteerd     0.61 0.23 0.09 0.07 0.00    0
Vijandig        0.78 0.14 0.06 0.02 0.01    0
Overstuur       0.68 0.19 0.07 0.06 0.01    0
Diep_ongelukkig 0.76 0.12 0.03 0.07 0.02    0
```

Fear – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis

Call: alpha(x = fearScale)


  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r

      0.88      0.88    0.87      0.56 7.6 0.017  1.7 0.79     0.57


 lower alpha upper     95% confidence boundaries
```

```
0.84 0.88 0.91

 Reliability if an item is dropped:
           raw_alpha std.alpha G6(smc) average_r S/N alpha se  var.r med.r
Angstig         0.85      0.86    0.84      0.56 6.4    0.020 0.0043  0.58
Bang            0.84      0.85    0.83      0.53 5.7    0.022 0.0037  0.55
Verschrikt      0.87      0.88    0.85      0.58 7.0    0.019 0.0022  0.58
Nerveus         0.85      0.86    0.84      0.55 6.0    0.021 0.0062  0.55
Gejaagd         0.86      0.87    0.85      0.57 6.6    0.020 0.0063  0.59
Onzeker         0.86      0.87    0.85      0.57 6.6    0.020 0.0035  0.58

 Item statistics
             n raw.r std.r r.cor r.drop mean   sd
Angstig    120  0.79  0.80  0.75   0.69  1.6 0.95
Bang       120  0.84  0.85  0.83   0.78  1.4 0.82
Verschrikt 120  0.71  0.75  0.68   0.62  1.3 0.74
Nerveus    120  0.83  0.83  0.78   0.73  1.9 1.06
Gejaagd    120  0.80  0.78  0.71   0.67  1.8 1.18
Onzeker    120  0.80  0.77  0.72   0.67  2.1 1.18

Non missing response frequency for each item
              1    2    3    4    5 miss
```

```
Angstig    0.61 0.25 0.08 0.03 0.03    0
Bang       0.69 0.22 0.06 0.02 0.02    0
Verschrikt 0.78 0.13 0.06 0.02 0.01    0
Nerveus    0.46 0.30 0.14 0.07 0.03    0
Gejaagd    0.57 0.21 0.07 0.12 0.03    0
Onzeker    0.40 0.26 0.19 0.11 0.04    0
```

Hostility – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis
Call: alpha(x = hostilityScale)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.78      0.78    0.77      0.37 3.5 0.031  1.4 0.51     0.32

 lower alpha upper     95% confidence boundaries
0.72 0.78 0.84

 Reliability if an item is dropped:
            raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
Boos             0.71      0.71    0.68      0.33 2.4    0.041 0.011  0.31
Geïrriteerd      0.73      0.73    0.72      0.35 2.7    0.038 0.016  0.34
Vijandig         0.72      0.73    0.71      0.35 2.7    0.039 0.012  0.32
```

Minachtend	0.75	0.75	0.73	0.37	2.9	0.035	0.020	0.33
Walging	0.77	0.78	0.77	0.41	3.5	0.032	0.014	0.40
Minachting	0.76	0.76	0.74	0.39	3.2	0.034	0.016	0.36

Item statistics

	n	raw.r	std.r	r.cor	r.drop	mean	sd
Boos	120	0.78	0.79	0.76	0.66	1.4	0.69
Geïrriteerd	120	0.75	0.73	0.66	0.57	1.6	0.91
Vijandig	120	0.74	0.73	0.68	0.59	1.3	0.74
Minachtend	120	0.68	0.68	0.59	0.50	1.4	0.78
Walging	120	0.55	0.58	0.43	0.38	1.2	0.64
Minachting	120	0.61	0.62	0.51	0.44	1.3	0.69

Non missing response frequency for each item

	1	2	3	4	5	miss
Boos	0.75	0.17	0.05	0.03	0.00	0
Geïrriteerd	0.61	0.23	0.09	0.07	0.00	0
Vijandig	0.78	0.14	0.06	0.02	0.01	0
Minachtend	0.73	0.16	0.08	0.02	0.01	0
Walging	0.84	0.08	0.06	0.02	0.00	0
Minachting	0.82	0.12	0.03	0.03	0.00	0

Guilt – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis
Call: alpha(x = guiltScale)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
       0.9       0.9    0.89       0.6 9.1 0.014  1.6 0.82     0.62

 lower alpha upper     95% confidence boundaries
0.87 0.9 0.93

 Reliability if an item is dropped:
                       raw_alpha std.alpha G6(smc) average_r S/N alpha se  var.r med.r
Schuldig                    0.88      0.88    0.86      0.60 7.5    0.017 0.0030  0.61
Beschaamd                   0.87      0.87    0.85      0.58 6.9    0.019 0.0027  0.57
Afkeurenswaardig            0.89      0.89    0.88      0.63 8.4    0.016 0.0026  0.63
Boos_op_mezelf              0.88      0.88    0.86      0.60 7.6    0.017 0.0034  0.61
Walg_van_mijzelf            0.87      0.88    0.86      0.59 7.3    0.018 0.0043  0.59
Ontevreden_over_mezelf      0.89      0.89    0.87      0.62 8.1    0.016 0.0028  0.63

 Item statistics
                         n raw.r std.r r.cor r.drop mean   sd
Schuldig               120  0.82  0.83  0.79   0.74  1.5 0.97
Beschaamd              120  0.86  0.86  0.84   0.79  1.4 0.94
Afkeurenswaardig       120  0.76  0.77  0.70   0.66  1.4 0.88
Boos_op_mezelf         120  0.82  0.82  0.77   0.73  1.5 0.99
Walg_van_mijzelf       120  0.84  0.84  0.80   0.77  1.5 0.95
Ontevreden_over_mezelf 120  0.81  0.79  0.73   0.69  2.0 1.25

Non missing response frequency for each item
                          1    2    3    4    5 miss
Schuldig               0.69 0.19 0.04 0.05 0.03    0
Beschaamd              0.76 0.13 0.04 0.04 0.03    0
Afkeurenswaardig       0.73 0.15 0.06 0.05 0.01    0
Boos_op_mezelf         0.78 0.09 0.07 0.03 0.03    0
Walg_van_mijzelf       0.72 0.12 0.10 0.06 0.01    0
Ontevreden_over_mezelf 0.47 0.26 0.13 0.07 0.07    0
```

Sadness – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis

Call: alpha(x = sadnessScale)
```

```
  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.89      0.89     0.9      0.63 8.5 0.016  1.8 0.89     0.61

 lower alpha upper     95% confidence boundaries
0.86 0.89 0.92

 Reliability if an item is dropped:
             raw_alpha std.alpha G6(smc) average_r S/N alpha se  var.r med.r
Verdrietig        0.87      0.87    0.88      0.63 6.8    0.019 0.0167  0.59
Truerig           0.87      0.87    0.88      0.63 6.9    0.019 0.0182  0.59
Neergeslagen      0.87      0.87    0.87      0.63 6.9    0.019 0.0152  0.61
Alleen            0.87      0.88    0.85      0.64 7.2    0.019 0.0030  0.64
Eenzaam           0.85      0.86    0.83      0.61 6.2    0.023 0.0086  0.60

 Item statistics
               n raw.r std.r r.cor r.drop mean   sd
Verdrietig   120  0.82  0.84  0.78   0.73  1.6 0.92
Truerig      120  0.81  0.83  0.77   0.72  1.6 0.94
Neergeslagen 120  0.81  0.83  0.77   0.71  1.6 0.97
Alleen       120  0.85  0.82  0.80   0.73  2.3 1.27
Eenzaam      120  0.90  0.87  0.86   0.81  2.0 1.21
```

```
Non missing response frequency for each item
                1    2    3    4    5 miss
Verdrietig   0.59 0.26 0.10 0.03 0.02    0
Truerig      0.59 0.24 0.10 0.06 0.01    0
Neergeslagen 0.65 0.21 0.07 0.06 0.02    0
Alleen       0.36 0.26 0.19 0.12 0.07    0
Eenzaam      0.48 0.30 0.07 0.09 0.06    0
```

Fatigue – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis
Call: alpha(x = fatigueScale)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.78      0.78    0.77      0.47 3.5 0.032  2.5 0.88     0.41

 lower alpha upper     95% confidence boundaries
0.72 0.78 0.85

 Reliability if an item is dropped:
         raw_alpha std.alpha G6(smc) average_r S/N alpha se  var.r med.r
Slaperig      0.64      0.64    0.55      0.37 1.8    0.057 0.0063  0.41
```

```
Moe            0.67      0.66    0.59      0.40 2.0    0.052 0.0143  0.40
Traag          0.81      0.80    0.77      0.57 4.0    0.031 0.0361  0.52
Soezerig       0.78      0.77    0.75      0.53 3.4    0.035 0.0490  0.41

 Item statistics
           n raw.r std.r r.cor r.drop mean  sd
Slaperig 120  0.88  0.87  0.87   0.75  2.7 1.2
Moe      120  0.85  0.84  0.83   0.71  3.0 1.2
Traag    120  0.65  0.67  0.47   0.43  2.1 1.0
Soezerig 120  0.71  0.71  0.55   0.49  2.0 1.1

Non missing response frequency for each item
            1    2    3    4    5 miss
Slaperig 0.19 0.29 0.22 0.23 0.07    0
Moe      0.10 0.25 0.29 0.24 0.12    0
Traag    0.31 0.38 0.17 0.12 0.02    0
Soezerig 0.42 0.29 0.17 0.08 0.03    0
```

Shyness – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis
Call: alpha(x = shynessScale)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean  sd median_r
```

```
      0.67      0.66    0.63      0.33   2 0.048  1.9 0.7     0.35

 lower alpha upper     95% confidence boundaries
0.58 0.67 0.76

 Reliability if an item is dropped:
             raw_alpha std.alpha G6(smc) average_r S/N alpha se  var.r med.r
Verlegen          0.57      0.55    0.51      0.29 1.2    0.064 0.0438  0.27
Bedeesd           0.60      0.61    0.51      0.34 1.5    0.061 0.0037  0.35
Schaapachtig      0.68      0.68    0.60      0.42 2.2    0.050 0.0069  0.40
Timide            0.52      0.52    0.45      0.26 1.1    0.073 0.0220  0.35

 Item statistics
               n raw.r std.r r.cor r.drop mean   sd
Verlegen     120  0.75  0.74  0.60   0.50  1.9 1.04
Bedeesd      120  0.71  0.69  0.56   0.45  2.2 1.01
Schaapachtig 120  0.56  0.61  0.39   0.31  1.4 0.81
Timide       120  0.79  0.77  0.68   0.56  2.2 1.08

Non missing response frequency for each item
                1    2    3    4    5 miss
Verlegen     0.48 0.30 0.13 0.07 0.03    0
```

```
Bedeesd      0.30 0.35 0.25 0.08 0.02    0
Schaapachtig 0.70 0.19 0.07 0.03 0.01    0
Timide       0.28 0.36 0.21 0.12 0.03    0
```

General Positive Affect – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis
Call: alpha(x = gpaScale)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.89      0.89     0.9      0.46 8.5 0.014  2.9 0.79     0.46

 lower alpha upper     95% confidence boundaries
0.87 0.89 0.92

 Reliability if an item is dropped:
              raw_alpha std.alpha G6(smc) average_r S/N alpha se  var.r med.r
Actief             0.88      0.88    0.89      0.45 7.2    0.017 0.0092  0.44
Alert              0.89      0.89    0.88      0.47 7.8    0.015 0.0069  0.47
Oplettend          0.89      0.89    0.88      0.47 8.0    0.015 0.0058  0.46
Enthousiast        0.88      0.88    0.88      0.44 7.1    0.017 0.0081  0.45
Opgewekt           0.89      0.89    0.89      0.47 7.9    0.015 0.0090  0.46
Geïnspireerd       0.88      0.88    0.89      0.46 7.7    0.016 0.0093  0.46
Geïnteresseerd     0.89      0.89    0.89      0.46 7.7    0.016 0.0100  0.46
```

Trors	0.89	0.89	0.90	0.47	8.0	0.015	0.0086	0.46
Sterk	0.88	0.88	0.89	0.45	7.5	0.016	0.0103	0.45
Vastberaden	0.88	0.88	0.89	0.46	7.6	0.016	0.0090	0.46

Item statistics

	n	raw.r	std.r	r.cor	r.drop	mean	sd
Actief	120	0.79	0.78	0.76	0.72	2.6	1.14
Alert	120	0.68	0.69	0.67	0.59	3.1	1.09
Oplettend	120	0.65	0.66	0.64	0.57	3.5	0.93
Enthousiast	120	0.82	0.81	0.80	0.76	2.7	1.18
Opgewekt	120	0.67	0.67	0.62	0.59	3.1	1.04
Geïnspireerd	120	0.72	0.71	0.67	0.63	2.6	1.15
Geïnteresseerd	120	0.71	0.71	0.66	0.63	3.1	1.07
Trors	120	0.66	0.66	0.60	0.57	2.3	1.18
Sterk	120	0.75	0.75	0.71	0.68	2.9	1.07
Vastberaden	120	0.73	0.72	0.68	0.65	2.8	1.18

Non missing response frequency for each item

	1	2	3	4	5	miss
Actief	0.22	0.22	0.32	0.21	0.03	0
Alert	0.08	0.20	0.30	0.33	0.08	0
Oplettend	0.03	0.12	0.25	0.49	0.11	0
Enthousiast	0.17	0.28	0.23	0.27	0.05	0
Opgewekt	0.10	0.17	0.30	0.41	0.03	0

Geïnspireerd	0.19	0.28	0.26	0.22	0.04	0
Geïnteresseerd	0.09	0.21	0.31	0.33	0.06	0
Trors	0.29	0.32	0.17	0.18	0.03	0
Sterk	0.10	0.25	0.31	0.29	0.05	0
Vastberaden	0.17	0.25	0.31	0.19	0.08	0

Joviality – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis
Call: alpha(x = jovialityScale)

  raw_alpha std.alpha G6(smc) average_r S/N    ase mean   sd median_r
      0.93      0.93    0.93      0.66  13 0.0096  2.9 0.96     0.62

 lower alpha upper     95% confidence boundaries
0.91 0.93 0.95

 Reliability if an item is dropped:
            raw_alpha std.alpha G6(smc) average_r S/N alpha se  var.r med.r
Opgewekt         0.93      0.93    0.92      0.68  13    0.010 0.0067  0.67
Blij             0.92      0.92    0.91      0.66  12    0.011 0.0053  0.65
Vrolijk          0.91      0.91    0.90      0.63  10    0.012 0.0042  0.61
Verheugd         0.93      0.93    0.93      0.68  13    0.010 0.0058  0.67
Enthousiast      0.92      0.92    0.92      0.66  11    0.011 0.0061  0.62
Levendig         0.92      0.92    0.91      0.64  11    0.012 0.0054  0.62
Energiek         0.92      0.92    0.91      0.65  11    0.012 0.0065  0.62

 Item statistics
              n raw.r std.r r.cor r.drop mean  sd
Opgewekt    120  0.78  0.79  0.73   0.71  3.1 1.0
Blij        120  0.83  0.84  0.81   0.77  3.0 1.1
Vrolijk     120  0.90  0.90  0.90   0.86  3.0 1.2
Verheugd    120  0.78  0.78  0.72   0.70  2.8 1.1
Enthousiast 120  0.85  0.84  0.81   0.78  2.7 1.2
Levendig    120  0.87  0.87  0.85   0.82  2.9 1.1
Energiek    120  0.87  0.86  0.84   0.81  2.6 1.2

Non missing response frequency for each item
               1    2    3    4    5 miss
Opgewekt    0.10 0.17 0.30 0.41 0.03    0
Blij        0.12 0.17 0.32 0.35 0.05    0
Vrolijk     0.12 0.21 0.26 0.31 0.10    0
Verheugd    0.17 0.25 0.28 0.26 0.04    0
Enthousiast 0.17 0.28 0.23 0.27 0.05    0
Levendig    0.13 0.26 0.28 0.28 0.05    0
Energiek    0.24 0.27 0.24 0.18 0.07    0
```

Self-Assurance – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis
Call: alpha(x = selfAssuranceScale)
```

```
  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.82      0.81    0.81      0.42 4.3 0.023  2.4 0.79     0.46

 lower alpha upper     95% confidence boundaries
0.78 0.82 0.87

 Reliability if an item is dropped:
              raw_alpha std.alpha G6(smc) average_r S/N alpha se  var.r med.r
Trors              0.80      0.79    0.78      0.42 3.7    0.026 0.0348  0.49
Sterk              0.77      0.76    0.74      0.39 3.2    0.031 0.0235  0.40
Zelfverzekerd      0.76      0.75    0.73      0.37 3.0    0.033 0.0226  0.40
Brutaal            0.84      0.84    0.82      0.52 5.4    0.023 0.0084  0.53
Onbevreesd         0.80      0.78    0.78      0.42 3.6    0.027 0.0351  0.46
Gedurfd            0.77      0.76    0.75      0.39 3.1    0.030 0.0351  0.40

 Item statistics
                n raw.r std.r r.cor r.drop mean   sd
Trors         120  0.72  0.70  0.62   0.56  2.3 1.18
Sterk         120  0.80  0.79  0.76   0.69  2.9 1.07
Zelfverzekerd 120  0.84  0.82  0.80   0.73  2.8 1.19
Brutaal       120  0.42  0.48  0.31   0.28  1.3 0.72
Onbevreesd    120  0.72  0.71  0.63   0.57  2.5 1.12
Gedurfd       120  0.80  0.79  0.74   0.67  2.4 1.14

Non missing response frequency for each item
                 1    2    3    4    5 miss
Trors         0.29 0.32 0.17 0.18 0.03    0
Sterk         0.10 0.25 0.31 0.29 0.05    0
Zelfverzekerd 0.17 0.22 0.28 0.28 0.06    0
Brutaal       0.78 0.17 0.03 0.03 0.01    0
Onbevreesd    0.21 0.30 0.25 0.22 0.03    0
Gedurfd       0.28 0.28 0.28 0.12 0.04    0
```

Attentiveness – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis
Call: alpha(x = attentivenessScale)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
       0.8      0.81    0.79      0.51 4.1 0.031  3.2 0.85      0.5

 lower alpha upper     95% confidence boundaries
0.74 0.8 0.86
```

```
 Reliability if an item is dropped:
              raw_alpha std.alpha G6(smc) average_r S/N alpha se  var.r med.r
Alert              0.68      0.69    0.63      0.43 2.3    0.050 0.0209  0.43
Oplettend          0.73      0.74    0.67      0.48 2.8    0.043 0.0154  0.43
Geconcentreerd     0.72      0.73    0.71      0.47 2.7    0.047 0.0581  0.39
Vastberaden        0.84      0.85    0.80      0.65 5.5    0.025 0.0078  0.62

 Item statistics
                 n raw.r std.r r.cor r.drop mean   sd
Alert          120  0.86  0.87  0.85   0.73  3.1 1.09
Oplettend      120  0.80  0.82  0.77   0.65  3.5 0.93
Geconcentreerd 120  0.83  0.83  0.74   0.67  3.3 1.07
Vastberaden    120  0.69  0.66  0.47   0.43  2.8 1.18

Non missing response frequency for each item
                 1    2    3    4    5 miss
Alert          0.08 0.20 0.30 0.33 0.08    0
Oplettend      0.03 0.12 0.25 0.49 0.11    0
Geconcentreerd 0.09 0.09 0.31 0.42 0.09    0
Vastberaden    0.17 0.25 0.31 0.19 0.08    0
```

Serenity – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis
Call: alpha(x = serenityScale)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.76      0.76    0.69      0.51 3.1 0.038  3.5 0.88     0.48

 lower alpha upper     95% confidence boundaries
0.69 0.76 0.83

 Reliability if an item is dropped:
            raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
Kalm             0.77      0.77    0.63      0.63 3.3    0.042    NA  0.63
Ontspannen       0.59      0.60    0.42      0.42 1.5    0.074    NA  0.42
Op_mjn_gemak     0.65      0.65    0.48      0.48 1.9    0.064    NA  0.48

 Item statistics
               n raw.r std.r r.cor r.drop mean   sd
Kalm         120  0.75  0.77  0.57   0.50  3.5 0.99
Ontspannen   120  0.86  0.86  0.76   0.66  3.5 1.08
Op_mjn_gemak 120  0.85  0.83  0.71   0.62  3.5 1.15
```

```
Non missing response frequency for each item
                1    2    3    4    5 miss
Kalm         0.03 0.17 0.18 0.51 0.12    0
Ontspannen   0.06 0.14 0.22 0.44 0.14    0
Op_mjn_gemak 0.07 0.13 0.17 0.45 0.17    0
```

Surprise – Cronbach's Alpha & Descriptive Statistics

```
Reliability analysis
Call: alpha(x = surpriseScale)

  raw_alpha std.alpha G6(smc) average_r S/N   ase mean   sd median_r
      0.74      0.75    0.67       0.5   3 0.041  1.6 0.72     0.47

 lower alpha upper     95% confidence boundaries
0.66 0.74 0.82

 Reliability if an item is dropped:
               raw_alpha std.alpha G6(smc) average_r S/N alpha se var.r med.r
Verrast             0.63      0.64    0.47      0.47 1.8    0.065    NA  0.47
Versteld_staan      0.64      0.64    0.47      0.47 1.8    0.066    NA  0.47
Verwonderd          0.69      0.71    0.56      0.56 2.5    0.053    NA  0.56

 Item statistics
                 n raw.r std.r r.cor r.drop mean   sd
Verrast        120  0.84  0.83  0.69   0.59  1.7 0.98
Versteld_staan 120  0.79  0.83  0.70   0.60  1.4 0.71
Verwonderd     120  0.81  0.79  0.61   0.53  1.8 0.94

Non missing response frequency for each item
                  1    2    3    4    5 miss
Verrast        0.57 0.24 0.12 0.05 0.02    0
Versteld_staan 0.74 0.16 0.08 0.02 0.00    0
Verwonderd     0.52 0.28 0.12 0.07 0.00    0
```

Correlational Analyses

	GNA	Fear	Sad.	Guilt	Host.	GPA	Jov.	SA	Att.	Shy.	Fat.	Seren.	Surp.	EV	Open.	Agre.	Neur.	Cons.
GNA	1																	

Fear	0.954	1																
Sad.	0.774	0.759	1															
Guilt	0.859	0.795	0.716	1														
Host.	0.734	0.630	0.536	0.616	1													
GPA	-0.114	-0.115	-0.278	-0.215	-0.043	1												
Jov.	-0.235	-0.225	-0.402	-0.309	-0.126	0.889	1											
SA	-0.147	-0.151	-0.275	-0.223	0.009	0.883	0.808	1										
Att.	-0.064	-0.064	-0.203	-0.187	-0.024	0.853	0.660	0.677	1									
Shy.	0.507	0.530	0.473	0.454	0.433	-0.017	-0.127	-0.031	0.014	1								
Fat.	0.461	0.488	0.422	0.410	0.281	-0.228	-0.370	-0.223	-0.224	0.457	1							
Seren.	-0.562	-0.546	-0.506	-0.511	-0.386	0.456	0.563	0.443	0.386	-0.150	-0.322	1						
Surp.	0.383	0.399	0.206	0.169	0.301	0.493	0.389	0.439	0.424	0.257	0.084	-0.037	1					
EV	-0.279	-0.295	-0.414	-0.354	-0.154	0.461	0.484	0.476	0.335	-0.461	-0.357	0.390	0.081	1				
Open.	0.062	0.007	-0.024	-0.039	0.030	0.313	0.235	0.281	0.298	-0.078	0.020	0.075	0.134	0.363	1			
Agre.	-0.380	-0.384	-0.276	-0.315	-0.320	0.289	0.333	0.247	0.249	-0.187	-0.291	0.380	0.056	0.310	0.005	1		
Neur.	0.419	0.470	0.344	0.319	0.299	-0.258	-0.262	-0.285	-0.207	0.154	0.322	-0.325	-0.028	-0.214	-0.035	-0.510	1	
Cons.	-0.200	-0.188	-0.188	-0.267	-0.208	0.239	0.244	0.257	0.211	-0.191	-0.107	0.155	0.105	0.300	0.141	0.211	-0.097	1

Note. GNA = General Negative Affect; Sad. = Sadness; Host. = Hostility; GPA = General Positive Affect; Jov. = Joviality; SA = Self-assurance; Att. = Attentiveness; Shy. = Shyness; Fat. = Fatigue; Seren. = Serenity; Surp. = Surprise; EV = Extraversion; Open. = Openness; Agre. = Agreeableness; Neur. = Neuroticism; Cons. = Conscientiousness.

Appendix R – Inferential Statistics for Study Four

Cyberball Manipulation

Fundamental Needs Questionnaire

T-Test: Comparison of FNQ subscale scores to midpoint

T-Test: FNQ Needs Scale Scores compared to Scale Midpoint

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	t1selfesteem	2.770491803278689	122	.693776568449457	.062811579211390
	MidpointA_1	2.500	122	.0000	.0000
Pair 2	t1belonging	2.426229508196722	122	.811150816761875	.073438144348535
	MidpointA_1	2.500	122	.0000	.0000
Pair 3	t1control	2.691256830601093	122	.741239664478568	.067108686019873
	MidpointA_1	2.500	122	.0000	.0000
Pair 4	t1meaningful	2.533	122	.8878	.0804
	MidpointA_1	2.500	122	.0000	.0000
Pair 5	t2selfesteem	2.153005464480874	122	.668245432254726	.060500098748687
	MidpointA_1	2.500	122	.0000	.0000
Pair 6	t2belonging	1.622950819672131	122	.598361429041982	.054173098381383
	MidpointA_1	2.500	122	.0000	.0000
Pair 7	t2control	1.781420765027323	122	.648188110816040	.058684194188621
	MidpointA_1	2.500	122	.0000	.0000
Pair 8	t2meaningful	1.738	122	.7447	.0674
	MidpointA_1	2.500	122	.0000	.0000

Paired Samples Correlations

		N	Correlation	Significance	
				One-Sided p	Two-Sided p
Pair 1	t1selfesteem & MidpointA_1	122	.	.	.
Pair 2	t1belonging & MidpointA_1	122	.	.	.
Pair 3	t1control & MidpointA_1	122	.	.	.

Pair 4	t1meaningful & MidpointA_1	122	.	.	.
Pair 5	t2selfesteem & MidpointA_1	122	.	.	.
Pair 6	t2belonging & MidpointA_1	122	.	.	.
Pair 7	t2control & MidpointA_1	122	.	.	.
Pair 8	t2meaningful & MidpointA_1	122	.	.	.

Paired Samples Test

		Paired Differences			
					95% Confid D
		Mean	Std. Deviation	Std. Error Mean	Lower
Pair 1	t1selfesteem - MidpointA_1	.270491803278689	.693776568449457	.062811579211390	.146139714890
Pair 2	t1belonging - MidpointA_1	-.073770491803279	.811150816761875	.073438144348535	.219160668770
Pair 3	t1control - MidpointA_1	.191256830601092	.741239664478568	.067108686019873	.058397485869
Pair 4	t1meaningful - MidpointA_1	.0328	.8878	.0804	-.12
Pair 5	t2selfesteem - MidpointA_1	-.346994535519126	.668245432254726	.060500098748687	.466770438649
Pair 6	t2belonging - MidpointA_1	-.877049180327869	.598361429041982	.054173098381383	.984299117405
Pair 7	t2control - MidpointA_1	-.718579234972678	.648188110816040	.058684194188621	.834760076059
Pair 8	t2meaningful - MidpointA_1	-.7623	.7447	.0674	-.89

Paired Samples Effect Sizes

					95% Co
			Standardizer[a]	Point Estimate	Lower
Pair 1	t1selfesteem - MidpointA_1	Cohen's d	.693776568449457	.390	.
		Hedges' correction	.695935997816577	.389	.
Pair 2	t1belonging - MidpointA_1	Cohen's d	.811150816761875	-.091	-.

		Hedges' correction	.813675581901744	-.091	-.268
Pair 3	t1control - MidpointA_1	Cohen's d	.741239664478568	.258	.077
		Hedges' correction	.743546826138879	.257	.077
Pair 4	t1meaningful - MidpointA_1	Cohen's d	.8878	.037	-.141
		Hedges' correction	.8906	.037	-.140
Pair 5	t2selfesteem - MidpointA_1	Cohen's d	.668245432254726	-.519	-.707
		Hedges' correction	.670325394127868	-.518	-.705
Pair 6	t2belonging - MidpointA_1	Cohen's d	.598361429041982	-1.466	-1.720
		Hedges' correction	.600223871938999	-1.461	-1.715
Pair 7	t2control - MidpointA_1	Cohen's d	.648188110816040	-1.109	-1.333
		Hedges' correction	.650205642836533	-1.105	-1.329
Pair 8	t2meaningful - MidpointA_1	Cohen's d	.7447	-1.024	-1.241
		Hedges' correction	.7470	-1.020	-1.238

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Cronbach's Alpha: Self-esteem

Case Processing Summary

		N	%
Cases	Valid	244	100.0
	Excluded[a]	0	.0
	Total	244	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.804	.808	3

Item Statistics

	Mean	Std. Deviation	N
selfesteem2	3.2377	1.00659	244
reverseSE1	2.7500	1.47928	244
reverseSE3	3.3484	1.44215	244

Inter-Item Correlation Matrix

	selfesteem2	reverseSE1	reverseSE3
selfesteem2	1.000	.444	.595
reverseSE1	.444	1.000	.714
reverseSE3	.595	.714	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
selfesteem2	6.0984	7.315	.560	.354	.833
reverseSE1	6.5861	4.820	.673	.511	.717
reverseSE3	5.9877	4.522	.778	.606	.584

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
9.3361	11.376	3.37288	3

Cronbach's Alpha: Belonging

Case Processing Summary

		N	%
Cases	Valid	244	100.0

	Excluded[a]	0	.0
	Total	244	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.764	.754	3

Item Statistics

	Mean	Std. Deviation	N
belonging2	2.0287	1.16675	244
reverseB1	3.0615	1.52088	244
reverseB3	2.8033	1.49699	244

Inter-Item Correlation Matrix

	belonging2	reverseB1	reverseB3
belonging2	1.000	.317	.413
reverseB1	.317	1.000	.786
reverseB3	.413	.786	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
belonging2	5.8648	8.134	.386	.171	.880
reverseB1	4.8320	5.046	.688	.618	.572
reverseB3	5.0902	4.798	.766	.648	.469

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
7.8934	12.063	3.47314	3

Cronbach's Alpha: Control

Case Processing Summary

		N	%
Cases	Valid	244	100.0
	Excluded[a]	0	.0
	Total	244	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.683	.688	3

Item Statistics

	Mean	Std. Deviation	N
control1	2.2377	1.25415	244
control3	2.2992	1.20554	244
reverseC2	3.3033	1.39894	244

Inter-Item Correlation Matrix

	control1	control3	reverseC2
control1	1.000	.522	.458
control3	.522	1.000	.290
reverseC2	.458	.290	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
control1	5.6025	4.389	.606	.375	.446
control3	5.5410	5.138	.468	.275	.626

reverseC2	4.5369	4.604	.431	.214	.685

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
7.8402	9.147	3.02443	3

Cronbach's Alpha: Meaningfulness

Case Processing Summary

		N	%
Cases	Valid	244	100.0
	Excluded[a]	0	.0
	Total	244	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.470	.473	2

Item Statistics

	Mean	Std. Deviation	N
reverseM2	3.2992	1.47009	244
meaningful1	2.2336	1.27283	244

Inter-Item Correlation Matrix

	reverseM2	meaningful1
reverseM2	1.000	.310
meaningful1	.310	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
reverseM2	2.2336	1.620	.310	.096	.
meaningful1	3.2992	2.161	.310	.096	.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
5.5328	4.941	2.22291	2

T-Test: Comparison of Mood subscale scores to midpoint

Paired Samples Statistics

Game			Mean	N	Std. Deviation	Std. Error Mean
1	Pair 1	midpoint	50.0000	122	.00000	.00000
		Mood	61.6544	122	14.00277	1.26775
2	Pair 1	midpoint	50.0000	122	.00000	.00000
		Mood	40.5515	122	15.90129	1.43964

Paired Samples Correlations

Game			N	Correlation	Sig.
1	Pair 1	midpoint & Mood	122	.	.
2	Pair 1	midpoint & Mood	122	.	.

Paired Samples Test

			Paired Differences			
						95% Confidence Inte Difference
Game			Mean	Std. Deviation	Std. Error Mean	Lower
1	Pair 1	midpoint - Mood	-11.65441	14.00277	1.26775	-14.16425
2	Pair 1	midpoint - Mood	9.44855	15.90129	1.43964	6.59841

Paired Samples Effect Sizes

Game				Standardizer[a]	Point Estimate	95% Confidence I	
						Lower	U
1	Pair 1	midpoint - Mood	Cohen's d	14.00277	-.832	-1.037	
			Hedges' correction	14.04635	-.830	-1.034	
2	Pair 1	midpoint - Mood	Cohen's d	15.90129	.594	.401	
			Hedges' correction	15.95078	.592	.399	

a. The denominator used in estimating the effect sizes.

Cohen's d uses the sample standard deviation of the mean difference.

Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

Cronbach's Alpha: Mood

Reliability Statistics

Cronbach's Alpha	N of Items
.709	4

Heart Rate Variability

rMSSD

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	baselineRMSSDln
2	lnrMSSDInclusion
3	lnrMSSDExclusion

Descriptive Statistics

	Mean	Std. Deviation	N
baselineRMSSDln	3.6342	.49249	106
lnrMSSDInclusion	3.7044	.46851	106
lnrMSSDExclusion	3.7695	.43667	106

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Squar
Time	Pillai's Trace	.128	7.611[b]	2.000	104.000	<.001	
	Wilks' Lambda	.872	7.611[b]	2.000	104.000	<.001	
	Hotelling's Trace	.146	7.611[b]	2.000	104.000	<.001	
	Roy's Largest Root	.146	7.611[b]	2.000	104.000	<.001	

a. Design: Intercept

Within Subjects Design: Time

b. Exact statistic

c. Computed using alpha = .05

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Eps Greenhouse-Geisser	Huynl
Time	.841	17.977	2	<.001	.863	

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proporti

a. Design: Intercept

Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Sphericity Assumed	.971	2	.485	10.745	<.0
	Greenhouse-Geisser	.971	1.726	.562	10.745	<.0
	Huynh-Feldt	.971	1.752	.554	10.745	<.0
	Lower-bound	.971	1.000	.971	10.745	.0
Error(Time)	Sphericity Assumed	9.484	210	.045		
	Greenhouse-Geisser	9.484	181.231	.052		
	Huynh-Feldt	9.484	183.981	.052		
	Lower-bound	9.484	105.000	.090		

a. Computed using alpha = .05

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	.970	1	.970	15.366	<.001	.1
	Quadratic	.000	1	.000	.018	.895	.0
Error(Time)	Linear	6.629	105	.063			
	Quadratic	2.856	105	.027			

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent Paramete
Intercept	4359.789	1	4359.789	7752.150	<.001	.987	775
Error	59.052	105	.562				

a. Computed using alpha = .05

Estimated Marginal Means

1. Grand Mean

Measure: MEASURE_1

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
3.703	.042	3.619	3.786

2. Time

Estimates

Measure: MEASURE_1

Time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound

1	3.634	.048	3.539	3.729
2	3.704	.046	3.614	3.795
3	3.769	.042	3.685	3.854

Pairwise Comparisons

Measure: MEASURE_1

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b] Lower Bound	Upper Bound
1	2	-.070*	.026	.009	-.123	-.018
	3	-.135*	.035	<.001	-.204	-.067
2	1	.070*	.026	.009	.018	.123
	3	-.065*	.026	.013	-.116	-.014
3	1	.135*	.035	<.001	.067	.204
	2	.065*	.026	.013	.014	.116

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.128	7.611[a]	2.000	104.000	<.001	.128
Wilks' lambda	.872	7.611[a]	2.000	104.000	<.001	.128
Hotelling's trace	.146	7.611[a]	2.000	104.000	<.001	.128
Roy's largest root	.146	7.611[a]	2.000	104.000	<.001	.128

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among

a. Exact statistic

b. Computed using alpha = .05

HF HRV

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	baselineHFmsln
2	lnHFInclusion
3	lnHFExclusion

Descriptive Statistics

	Mean	Std. Deviation	N
baselineHFmsln	6.4554	1.05349	106
lnHFInclusion	6.4597	.97567	106
lnHFExclusion	6.5264	.93094	106

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Time	Pillai's Trace	.011	.585[b]	2.000	104.000	.559	.01
	Wilks' Lambda	.989	.585[b]	2.000	104.000	.559	.01
	Hotelling's Trace	.011	.585[b]	2.000	104.000	.559	.01
	Roy's Largest Root	.011	.585[b]	2.000	104.000	.559	.01

a. Design: Intercept

Within Subjects Design: Time

b. Exact statistic

c. Computed using alpha = .05

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt
Time	.887	12.432	2	.002	.899	.91

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to

a. Design: Intercept

Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests o

Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Sphericity Assumed	.336	2	.168	.602	.5
	Greenhouse-Geisser	.336	1.797	.187	.602	.5
	Huynh-Feldt	.336	1.827	.184	.602	.5
	Lower-bound	.336	1.000	.336	.602	.4
Error(Time)	Sphericity Assumed	58.661	210	.279		
	Greenhouse-Geisser	58.661	188.735	.311		
	Huynh-Feldt	58.661	191.816	.306		
	Lower-bound	58.661	105.000	.559		

a. Computed using alpha = .05

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Parti Squ
Time	Linear	.268	1	.268	.722	.397	
	Quadratic	.069	1	.069	.366	.546	
Error(Time)	Linear	38.910	105	.371			
	Quadratic	19.751	105	.188			

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	N Pa
Intercept	13355.022	1	13355.022	5635.638	<.001	.982	
Error	248.823	105	2.370				

a. Computed using alpha = .05

Estimated Marginal Means

1. Grand Mean

Measure: MEASURE_1

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
6.481	.086	6.309	6.652

2. Time

Estimates

Measure: MEASURE_1

Time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	6.455	.102	6.252	6.658
2	6.460	.095	6.272	6.648
3	6.526	.090	6.347	6.706

Pairwise Comparisons

Measure: MEASURE_1

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[a]	95% Confidence Interval for Difference[a]	
					Lower Bound	Upper Bound
1	2	-.004	.069	.950	-.141	.133
	3	-.071	.084	.397	-.237	.095
2	1	.004	.069	.950	-.133	.141
	3	-.067	.064	.297	-.193	.060
3	1	.071	.084	.397	-.095	.237
	2	.067	.064	.297	-.060	.193

Based on estimated marginal means

a. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Nonc Paran
Pillai's trace	.011	.585[a]	2.000	104.000	.559	.011	
Wilks' lambda	.989	.585[a]	2.000	104.000	.559	.011	

Hotelling's trace	.011	.585[a]	2.000	104.000	.559	.011
Roy's largest root	.011	.585[a]	2.000	104.000	.559	.011

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among

a. Exact statistic

b. Computed using alpha = .05

LF:HF HRV

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	baselineLFHFln
2	lnLFHFInclusion
3	lnLFHFExclusion

Descriptive Statistics

	Mean	Std. Deviation	N
baselineLFHFln	.4268	.78929	106
lnLFHFInclusion	.2837	.74410	106
lnLFHFExclusion	.4691	.92464	106

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Squar
Time	Pillai's Trace	.064	3.566[b]	2.000	104.000	.032	
	Wilks' Lambda	.936	3.566[b]	2.000	104.000	.032	
	Hotelling's Trace	.069	3.566[b]	2.000	104.000	.032	
	Roy's Largest Root	.069	3.566[b]	2.000	104.000	.032	

a. Design: Intercept
Within Subjects Design: Time

b. Exact statistic

c. Computed using alpha = .05

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b] Greenhouse-Geisser	Huynh-Feldt
Time	.834	18.907	2	<.001	.857	.87

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to

a. Design: Intercept

Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests o

Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Sphericity Assumed	2.001	2	1.000	2.725	.068
	Greenhouse-Geisser	2.001	1.715	1.167	2.725	.077
	Huynh-Feldt	2.001	1.741	1.149	2.725	.076
	Lower-bound	2.001	1.000	2.001	2.725	.102
Error(Time)	Sphericity Assumed	77.105	210	.367		
	Greenhouse-Geisser	77.105	180.067	.428		
	Huynh-Feldt	77.105	182.767	.422		
	Lower-bound	77.105	105.000	.734		

a. Computed using alpha = .05

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	.095	1	.095	.205	.652	.0
	Quadratic	1.906	1	1.906	7.014	.009	.0
Error(Time)	Linear	48.569	105	.463			
	Quadratic	28.536	105	.272			

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	No Par
Intercept	49.158	1	49.158	37.893	<.001	.265	
Error	136.215	105	1.297				

a. Computed using alpha = .05

Estimated Marginal Means

1. Grand Mean

Measure: MEASURE_1

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
.393	.064	.267	.520

2. Time

Estimates

Measure: MEASURE_1

Time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	.427	.077	.275	.579
2	.284	.072	.140	.427
3	.469	.090	.291	.647

Pairwise Comparisons

Measure: MEASURE_1

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]

					Lower Bound	Upper Bound
1	2	.143*	.064	.028	.015	.271
	3	-.042	.093	.652	-.227	.143
2	1	-.143*	.064	.028	-.271	-.015
	3	-.185*	.089	.040	-.362	-.009
3	1	.042	.093	.652	-.143	.227
	2	.185*	.089	.040	.009	.362

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared	Nonc Paran
Pillai's trace	.064	3.566[a]	2.000	104.000	.032	.064	
Wilks' lambda	.936	3.566[a]	2.000	104.000	.032	.064	
Hotelling's trace	.069	3.566[a]	2.000	104.000	.032	.064	
Roy's largest root	.069	3.566[a]	2.000	104.000	.032	.064	

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among the es

a. Exact statistic

b. Computed using alpha = .05

Heart Rate

Within-Subjects Factors

Measure: MEASURE_1

Time	Dependent Variable
1	HRBaseline
2	HRInclusion
3	HRExclusion

Descriptive Statistics

	Mean	Std. Deviation	N
HRBaseline	80.0422	10.19859	106
HRInclusion	77.1040	9.45630	106
HRExclusion	81.1487	11.91706	106

Multivariate Tests[a]

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Squar
Time	Pillai's Trace	.458	44.017[b]	2.000	104.000	<.001	
	Wilks' Lambda	.542	44.017[b]	2.000	104.000	<.001	
	Hotelling's Trace	.846	44.017[b]	2.000	104.000	<.001	
	Roy's Largest Root	.846	44.017[b]	2.000	104.000	<.001	

a. Design: Intercept

Within Subjects Design: Time

b. Exact statistic

c. Computed using alpha = .05

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsi Greenhouse-Geisser	Huynh
Time	.637	46.849	2	<.001	.734	

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proporti

a. Design: Intercept

Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the T

Effects table.

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Sphericity Assumed	926.340	2	463.170	26.427	<.0
	Greenhouse-Geisser	926.340	1.468	631.147	26.427	<.0
	Huynh-Feldt	926.340	1.483	624.482	26.427	<.0
	Lower-bound	926.340	1.000	926.340	26.427	<.0
Error(Time)	Sphericity Assumed	3680.590	210	17.527		

	Greenhouse-Geisser	3680.590	154.109	23.883			
	Huynh-Feldt	3680.590	155.754	23.631			
	Lower-bound	3680.590	105.000	35.053			

a. Computed using alpha = .05

Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Linear	64.891	1	64.891	2.709	.103	.0
	Quadratic	861.448	1	861.448	77.640	<.001	.4
Error(Time)	Linear	2515.572	105	23.958			
	Quadratic	1165.017	105	11.095			

a. Computed using alpha = .05

Tests of Between-Subjects Effects

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent Paramete
Intercept	2006382.738	1	2006382.738	6679.130	<.001	.985	667
Error	31541.562	105	300.396				

a. Computed using alpha = .05

Estimated Marginal Means

1. Grand Mean

Measure: MEASURE_1

Mean	Std. Error	95% Confidence Interval Lower Bound	Upper Bound
79.432	.972	77.504	81.359

2. Time

Estimates

Measure: MEASURE_1

Time	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	80.042	.991	78.078	82.006
2	77.104	.918	75.283	78.925
3	81.149	1.157	78.854	83.444

Pairwise Comparisons

Measure: MEASURE_1

(I) Time	(J) Time	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	2.938*	.365	<.001	2.214	3.662
	3	-1.107	.672	.103	-2.440	.227
2	1	-2.938*	.365	<.001	-3.662	-2.214
	3	-4.045*	.638	<.001	-5.309	-2.780
3	1	1.107	.672	.103	-.227	2.440
	2	4.045*	.638	<.001	2.780	5.309

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Least Significant Difference (equivalent to no adjustments).

Multivariate Tests

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.458	44.017[a]	2.000	104.000	<.001	.458
Wilks' lambda	.542	44.017[a]	2.000	104.000	<.001	.458
Hotelling's trace	.846	44.017[a]	2.000	104.000	<.001	.458
Roy's largest root	.846	44.017[a]	2.000	104.000	<.001	.458

Each F tests the multivariate effect of Time. These tests are based on the linearly independent pairwise comparisons among

a. Exact statistic

b. Computed using alpha = .05

Positive and Negative Affect Schedule – Extended (PANAS-X) and the Dutch Version of the PANAS-X (PANAS-XD) Analyses

PANAS-X (English Responses) – Cronbach's Alpha and Descriptive statistics

General Negative Affect – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.845	.861	10

Item Statistics

	Mean	Std. Deviation	N
Afraid	.21	.635	86
Scared	.22	.658	86
Nervous	.60	1.021	86
Guilty	.27	.710	86
Ashamed	.24	.612	86
Irritable	.93	1.115	86
Hostile	.49	.930	86
Upset	.50	.930	86
Distressed	.91	1.144	86
Jittery	.63	.921	86

Inter-Item Correlation Matrix

	Afraid	Scared	Nervous	Guilty	Ashamed	Irritable	Hostile	Upset
Afraid	1.000	.733	.511	.449	.594	.370	.423	.379
Scared	.733	1.000	.587	.476	.594	.278	.437	.240

Nervous	.511	.587	1.000	.407	.533	.327	.516
Guilty	.449	.476	.407	1.000	.525	.262	.281
Ashamed	.594	.594	.533	.525	1.000	.370	.429
Irritable	.370	.278	.327	.262	.370	1.000	.431
Hostile	.423	.437	.516	.281	.429	.431	1.000
Upset	.379	.240	.285	.098	.320	.624	.340
Distressed	.173	.231	.291	.277	.301	.364	.364
Jittery	.256	.293	.367	.334	.455	.238	.558

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Afraid	4.79	28.332	.616	.618	.828
Scared	4.78	28.198	.610	.631	.828
Nervous	4.40	25.512	.615	.464	.823
Guilty	4.73	28.692	.486	.367	.836
Ashamed	4.76	28.163	.670	.546	.825
Irritable	4.07	25.454	.551	.492	.831
Hostile	4.51	25.947	.642	.499	.821
Upset	4.50	27.712	.441	.454	.840
Distressed	4.09	26.085	.471	.385	.841
Jittery	4.37	26.942	.534	.526	.831

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
5.00	32.894	5.735	10

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value (		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.352[a]	.274	.446	6.442	85	76
Average Measures	.845[c]	.791	.889	6.442	85	76

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Fear – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.856	.864	6

Item Statistics

	Mean	Std. Deviation	N
Afraid	.21	.635	86
Scared	.22	.658	86
Nervous	.60	1.021	86
Jittery	.63	.921	86
Frightened	.33	.789	86
Shaky	.43	.902	86

Inter-Item Correlation Matrix

	Afraid	Scared	Nervous	Jittery	Frightened	Shaky
Afraid	1.000	.733	.511	.256	.567	.355
Scared	.733	1.000	.587	.293	.585	.433
Nervous	.511	.587	1.000	.367	.702	.519
Jittery	.256	.293	.367	1.000	.509	.691
Frightened	.567	.585	.702	.509	1.000	.611
Shaky	.355	.433	.519	.691	.611	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Afraid	2.21	11.556	.590	.569	.844
Scared	2.20	11.196	.653	.609	.834
Nervous	1.81	9.236	.681	.551	.828
Jittery	1.79	10.426	.543	.496	.853
Frightened	2.09	9.968	.786	.635	.806
Shaky	1.99	9.800	.690	.588	.823

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
2.42	14.505	3.809	6

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value (		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.497[a]	.404	.596	6.935	85	42
Average Measures	.856[c]	.803	.898	6.935	85	42

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Guilt – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.870	.871	6

Item Statistics

	Mean	Std. Deviation	N
Guilty	.27	.710	86
Ashamed	.24	.612	86
Blameworthy	.37	.908	86
Angry at self	.55	1.081	86

Disgusted with Self	.45	1.081	86
Dissatisfied with Self	.60	1.088	86

Inter-Item Correlation Matrix

	Guilty	Ashamed	Blameworthy	Angry at self	Disgusted with Self	Dissatisfied with Self
Guilty	1.000	.525	.592	.344	.423	.306
Ashamed	.525	1.000	.512	.596	.311	.323
Blameworthy	.592	.512	1.000	.737	.569	.544
Angry at self	.344	.596	.737	1.000	.641	.626
Disgusted with Self	.423	.311	.569	.641	1.000	.885
Dissatisfied with Self	.306	.323	.544	.626	.885	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Guilty	2.22	15.609	.511	.562	.872
Ashamed	2.24	15.951	.543	.526	.870
Blameworthy	2.12	13.186	.754	.684	.833
Angry at self	1.94	12.079	.763	.736	.830
Disgusted with Self	2.03	12.058	.767	.829	.830
Dissatisfied with Self	1.88	12.269	.726	.803	.838

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
2.49	18.982	4.357	6

Intraclass Correlation Coefficient

	Intraclass	95% Confidence Interval		F Test with True Value 0			
	Correlation[b]	Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.527[a]	.435	.622	7.680	85	425	.000
Average Measures	.870[c]	.822	.908	7.680	85	425	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Hostility – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.772	.774	6

Item Statistics

	Mean	Std. Deviation	N
Angry	.42	.951	86
Irritable	.93	1.115	86
Hostile	.49	.930	86
Scornful	.77	.890	86
Disgusted	.31	.815	86
Loathing	.63	.908	86

Inter-Item Correlation Matrix

	Angry	Irritable	Hostile	Scornful	Disgusted	Loathing
Angry	1.000	.516	.285	.200	.526	.400
Irritable	.516	1.000	.431	.256	.465	.207
Hostile	.285	.431	1.000	.395	.416	.482
Scornful	.200	.256	.395	1.000	.199	.474
Disgusted	.526	.465	.416	.199	1.000	.191
Loathing	.400	.207	.482	.474	.191	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Angry	3.13	10.489	.559	.468	.727
Irritable	2.62	9.839	.537	.395	.735
Hostile	3.06	10.479	.581	.422	.722
Scornful	2.78	11.492	.423	.275	.760
Disgusted	3.23	11.310	.522	.391	.738
Loathing	2.92	11.040	.493	.431	.744

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
3.55	14.839	3.852	6

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.361[a]	.269	.465	4.384	85	425
Average Measures	.772[c]	.688	.839	4.384	85	425

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Sadness – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.797	.796	5

Item Statistics

	Mean	Std. Deviation	N
Sad	.55	.966	86
Blue	.51	.967	86
Downhearted	.69	.885	86
Alone	1.15	1.223	86
Lonely	.94	1.162	86

Inter-Item Correlation Matrix

	Sad	Blue	Downhearted	Alone	Lonely
Sad	1.000	.390	.423	.368	.500
Blue	.390	1.000	.410	.372	.540
Downhearted	.423	.410	1.000	.284	.348
Alone	.368	.372	.284	1.000	.744
Lonely	.500	.540	.348	.744	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Sad	3.29	10.797	.542	.326	.770
Blue	3.33	10.716	.556	.355	.766
Downhearted	3.15	11.636	.456	.255	.793
Alone	2.69	9.206	.603	.556	.754
Lonely	2.90	8.660	.755	.662	.695

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
3.84	15.173	3.895	5

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.440[a]	.340	.547	4.934	85	340
Average Measures	.797[c]	.721	.858	4.934	85	340

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Fatigue – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.633	.617	4

Item Statistics

	Mean	Std. Deviation	N
Sleepy	2.17	1.321	86
Tired	2.16	1.371	86
Sluggish	.78	.999	86
Drowsy	.76	1.005	86

Inter-Item Correlation Matrix

	Sleepy	Tired	Sluggish	Drowsy
Sleepy	1.000	.744	.154	.236
Tired	.744	1.000	.018	.226
Sluggish	.154	.018	1.000	.344
Drowsy	.236	.226	.344	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Sleepy	3.70	5.249	.616	.574	.389
Tired	3.71	5.479	.525	.571	.472
Sluggish	5.09	8.579	.196	.153	.690
Drowsy	5.12	7.775	.346	.168	.608

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
5.87	10.725	3.275	4

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value (		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.301[a]	.192	.422	2.725	85	25
Average Measures	.633[c]	.488	.745	2.725	85	25

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Shyness – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

	N	%

Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.650	.655	4

Item Statistics

	Mean	Std. Deviation	N
Shy	.58	1.011	86
Bashful	.95	1.051	86
Sheepish	.74	.935	86
Timid	.70	.946	86

Inter-Item Correlation Matrix

	Shy	Bashful	Sheepish	Timid
Shy	1.000	.148	.395	.481
Bashful	.148	1.000	.299	.234
Sheepish	.395	.299	1.000	.377
Timid	.481	.234	.377	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Shy	2.40	4.595	.457	.285	.562
Bashful	2.02	5.129	.287	.107	.683
Sheepish	2.23	4.722	.493	.244	.540
Timid	2.28	4.651	.503	.286	.532

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
2.98	7.599	2.757	4

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value (		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.317[a]	.207	.437	2.854	85	25
Average Measures	.650[c]	.511	.757	2.854	85	25

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

General Positive Affect – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.894	.894	9

Item Statistics

	Mean	Std. Deviation	N
Attentive	1.78	1.078	86
Active	1.13	1.125	86

Enthusiastic	1.08	1.258	86
Excited	.92	1.119	86
Inspired	1.06	1.349	86
Interested	1.79	1.199	86
Proud	1.01	1.269	86
Strong	1.35	1.281	86
Determined	1.30	1.117	86

Inter-Item Correlation Matrix

	Attentive	Active	Enthusiastic	Excited	Inspired	Interested	Proud	Stro
Attentive	1.000	.450	.439	.443	.413	.446	.294	
Active	.450	1.000	.583	.569	.491	.474	.378	
Enthusiastic	.439	.583	1.000	.832	.621	.565	.537	
Excited	.443	.569	.832	1.000	.627	.583	.481	
Inspired	.413	.491	.621	.627	1.000	.538	.645	
Interested	.446	.474	.565	.583	.538	1.000	.450	
Proud	.294	.378	.537	.481	.645	.450	1.000	
Strong	.406	.418	.369	.365	.546	.385	.453	1
Determined	.330	.521	.426	.415	.558	.425	.495	

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Attentive	9.64	53.810	.533	.323	.891
Active	10.29	51.597	.652	.479	.882
Enthusiastic	10.34	48.720	.746	.734	.874
Excited	10.50	50.394	.740	.729	.876
Inspired	10.36	47.363	.766	.625	.873
Interested	9.63	50.825	.651	.441	.882
Proud	10.41	50.362	.634	.485	.884
Strong	10.07	51.407	.563	.378	.890
Determined	10.12	52.339	.607	.426	.886

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
11.42	63.399	7.962	9

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value (		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.484[a]	.399	.577	9.428	85	68
Average Measures	.894[c]	.857	.925	9.428	85	68

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Joviality – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.950	.951	8

Item Statistics

	Mean	Std. Deviation	N
Happy	1.64	1.310	86
Cheerful	1.44	1.325	86
Joyful	1.05	1.245	86
Delighted	1.30	1.355	86
Enthusiastic	1.08	1.258	86

Excited	.92	1.119	86
Lively	1.27	1.278	86
Energetic	1.01	1.183	86

Inter-Item Correlation Matrix

	Happy	Cheerful	Joyful	Delighted	Enthusiastic	Excited	Lively	Energ
Happy	1.000	.784	.746	.659	.611	.558	.698	
Cheerful	.784	1.000	.757	.809	.684	.572	.666	
Joyful	.746	.757	1.000	.793	.824	.805	.761	
Delighted	.659	.809	.793	1.000	.752	.653	.625	
Enthusiastic	.611	.684	.824	.752	1.000	.832	.726	
Excited	.558	.572	.805	.653	.832	1.000	.690	
Lively	.698	.666	.761	.625	.726	.690	1.000	
Energetic	.595	.597	.742	.629	.766	.694	.760	

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Happy	8.07	58.419	.765	.699	.947
Cheerful	8.27	57.469	.808	.775	.944
Joyful	8.66	56.861	.908	.837	.937
Delighted	8.41	56.974	.814	.752	.944
Enthusiastic	8.63	57.483	.860	.810	.940
Excited	8.79	60.497	.787	.753	.945
Lively	8.44	58.038	.811	.706	.944
Energetic	8.70	59.719	.784	.683	.945

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
9.71	75.456	8.687	8

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.704[a]	.633	.773	20.045	85	595

Average Measures	.950[c]	.932	.965	20.045	85	59

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Self-Assurance – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.795	.793	6

Item Statistics

	Mean	Std. Deviation	N
Proud	1.01	1.269	86
Strong	1.35	1.281	86
Confident	1.69	1.239	86
Bold	.83	1.119	86
Fearless	1.53	1.317	86
Daring	1.24	1.168	86

Inter-Item Correlation Matrix

	Proud	Strong	Confident	Bold	Fearless	Daring
Proud	1.000	.453	.533	.267	.376	.395
Strong	.453	1.000	.351	.256	.578	.579
Confident	.533	.351	1.000	.384	.385	.395
Bold	.267	.256	.384	1.000	.112	.312
Fearless	.376	.578	.385	.112	1.000	.465
Daring	.395	.579	.395	.312	.465	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Proud	6.64	19.104	.571	.371	.758
Strong	6.30	18.402	.638	.491	.741
Confident	5.97	19.258	.576	.394	.757
Bold	6.83	22.099	.352	.201	.804
Fearless	6.12	19.092	.541	.402	.765
Daring	6.41	19.397	.612	.409	.749

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
7.65	27.053	5.201	6

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.392[a]	.299	.496	4.871	85	425
Average Measures	.795[c]	.719	.855	4.871	85	425

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Attentiveness – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.630	.630	4

Item Statistics

	Mean	Std. Deviation	N
Alert	1.01	1.111	86
Attentive	1.78	1.078	86
Concentrating	1.99	1.101	86
Determined	1.30	1.117	86

Inter-Item Correlation Matrix

	Alert	Attentive	Concentrating	Determined
Alert	1.000	.375	.173	.338
Attentive	.375	1.000	.355	.330
Concentrating	.173	.355	1.000	.223
Determined	.338	.330	.223	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Alert	5.07	5.807	.404	.193	.564
Attentive	4.30	5.508	.501	.255	.494
Concentrating	4.09	6.179	.331	.139	.615
Determined	4.78	5.774	.406	.173	.562

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
6.08	9.205	3.034	4

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	
Single Measures	.298[a]	.189	.419	2.700	85	255	
Average Measures	.630[c]	.483	.743	2.700	85	255	

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Serenity – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.760	.768	3

Item Statistics

	Mean	Std. Deviation	N
Calm	2.49	1.093	86

Relaxed	2.26	1.238	86
At ease	1.66	1.307	86

Inter-Item Correlation Matrix

	Calm	Relaxed	At ease
Calm	1.000	.672	.454
Relaxed	.672	1.000	.446
At ease	.454	.446	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Calm	3.92	4.687	.659	.481	.617
Relaxed	4.15	4.200	.643	.476	.618
At ease	4.74	4.546	.492	.243	.800

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
6.41	8.997	3.000	3

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value (		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.514[a]	.390	.630	4.173	85	17
Average Measures	.760[c]	.657	.836	4.173	85	17

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Surprise – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

	N	%

Cases	Valid	86	100.0
	Excluded[a]	0	.0
	Total	86	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.839	.842	3

Item Statistics

	Mean	Std. Deviation	N
Surprised	.59	.938	86
Amazed	.81	1.153	86
Astonished	.67	.939	86

Inter-Item Correlation Matrix

	Surprised	Amazed	Astonished
Surprised	1.000	.636	.556
Amazed	.636	1.000	.726
Astonished	.556	.726	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Surprised	1.49	3.782	.646	.424	.831
Amazed	1.27	2.739	.772	.605	.715
Astonished	1.41	3.585	.718	.542	.768

Scale Statistics

Mean	Variance	Std. Deviation	N of Items

2.08	7.017	2.649	3

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value (		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.635[a]	.528	.730	6.227	85	17
Average Measures	.839[c]	.770	.890	6.227	85	17

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

PANAS-XD (Dutch Responses) – Cronbach's Alpha and Descriptive statistics

General Negative Affect – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.845	.874	10

Item Statistics

	Mean	Std. Deviation	N
Angstig	.22	.579	160
Bang	.14	.508	160

Nerveus	.73	.881	160
Schuldig	.20	.524	160
Beschaamd	.37	.706	160
Ge�rriteerd	.91	1.112	160
Vijandig	.27	.661	160
Overstuur	.20	.591	160
Diepongelukkig	.12	.410	160
Gejaagd	.51	.777	160

Inter-Item Correlation Matrix

	Angstig	Bang	Nerveus	Schuldig	Beschaamd	Ge�rriteerd	Vijandig
Angstig	1.000	.603	.387	.353	.401	.225	.585
Bang	.603	1.000	.392	.582	.542	.333	.527
Nerveus	.387	.392	1.000	.308	.383	.130	.308
Schuldig	.353	.582	.308	1.000	.565	.397	.407
Beschaamd	.401	.542	.383	.565	1.000	.298	.447
Ge�rriteerd	.225	.333	.130	.397	.298	1.000	.357
Vijandig	.585	.527	.308	.407	.447	.357	1.000
Overstuur	.349	.515	.225	.378	.350	.476	.473
Diepongelukkig	.419	.676	.298	.474	.413	.340	.531
Gejaagd	.409	.349	.356	.414	.437	.335	.578

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Angstig	3.44	17.456	.586	.492	.828
Bang	3.53	17.370	.709	.686	.822
Nerveus	2.93	16.794	.423	.250	.846
Schuldig	3.46	17.609	.625	.474	.827
Beschaamd	3.29	16.624	.609	.441	.825
Ge�rriteerd	2.75	15.497	.444	.306	.856
Vijandig	3.39	16.555	.676	.557	.819
Overstuur	3.46	17.458	.571	.403	.829
Diepongelukkig	3.54	18.275	.623	.520	.831
Gejaagd	3.16	16.321	.590	.434	.826

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
3.66	20.628	4.542	10

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value (		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.353[a]	.294	.420	6.456	159	143
Average Measures	.845[c]	.807	.879	6.456	159	143

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Fear – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.800	.828	6

Item Statistics

	Mean	Std. Deviation	N
Bang	.14	.508	160
Verschrikt	.19	.577	160

Angstig	.22	.579	160
Nerveus	.73	.881	160
Gejaagd	.51	.777	160
Onzeker	.64	.865	160

Inter-Item Correlation Matrix

	Bang	Verschrikt	Angstig	Nerveus	Gejaagd	Onzeker
Bang	1.000	.660	.603	.392	.349	.487
Verschrikt	.660	1.000	.606	.363	.579	.431
Angstig	.603	.606	1.000	.387	.409	.385
Nerveus	.392	.363	.387	1.000	.356	.300
Gejaagd	.349	.579	.409	.356	1.000	.368
Onzeker	.487	.431	.385	.300	.368	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Bang	2.29	7.112	.663	.553	.758
Verschrikt	2.23	6.720	.705	.603	.744
Angstig	2.21	6.919	.627	.461	.759
Nerveus	1.69	6.327	.465	.230	.800
Gejaagd	1.92	6.415	.545	.388	.772
Onzeker	1.79	6.219	.509	.290	.786

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
2.42	9.164	3.027	6

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.400[a]	.331	.475	4.999	159	795
Average Measures	.800[c]	.748	.844	4.999	159	795

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Hostility – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.803	.825	6

Item Statistics

	Mean	Std. Deviation	N
Boos	.31	.675	160
Ge�rriteerd	.91	1.112	160
Vijandig	.27	.661	160
Minachtend	.45	.775	160
Minachting	.29	.628	160
Walging	.24	.569	160

Inter-Item Correlation Matrix

	Boos	Ge�rriteerd	Vijandig	Minachtend	Minachting	Walging
Boos	1.000	.565	.671	.222	.454	.472
Ge�rriteerd	.565	1.000	.357	.352	.468	.421
Vijandig	.671	.357	1.000	.303	.615	.494
Minachtend	.222	.352	.303	1.000	.469	.306

Minachting	.454	.468	.615	.469	1.000	.418
Walging	.472	.421	.494	.306	.418	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Boos	2.16	7.533	.655	.584	.753
Ge�rriteerd	1.56	6.009	.581	.439	.790
Vijandig	2.21	7.662	.633	.608	.758
Minachtend	2.03	7.936	.430	.257	.801
Minachting	2.19	7.713	.661	.507	.755
Walging	2.23	8.254	.562	.331	.777

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
2.48	10.414	3.227	6

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.404[a]	.335	.479	5.064	159	795
Average Measures	.803[c]	.751	.846	5.064	159	795

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Guilt – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.881	.893	6

Item Statistics

	Mean	Std. Deviation	N
Schuldig	.20	.524	160
Beschaamd	.37	.706	160
Afkeurenswaardig	.39	.802	160
Boosopmezelf	.23	.606	160
Walgvanmijzelf	.16	.500	160
Ontevredenovermezelf	.42	.731	160

Inter-Item Correlation Matrix

	Schuldig	Beschaamd	Afkeurenswaardig	Boosopmezelf	Walgvanmijzelf
Schuldig	1.000	.565	.560	.685	.692
Beschaamd	.565	1.000	.553	.461	.577
Afkeurenswaardig	.560	.553	1.000	.562	.561
Boosopmezelf	.685	.461	.562	1.000	.663
Walgvanmijzelf	.692	.577	.561	.663	1.000
Ontevredenovermezelf	.601	.442	.522	.660	.638

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's if Item Dele
Schuldig	1.58	7.240	.762	.608	
Beschaamd	1.41	6.859	.623	.436	
Afkeurenswaardig	1.38	6.313	.671	.457	
Boosopmezelf	1.54	6.929	.740	.602	

Walgvanmijzelf	1.61	7.321	.772	.614	.854
Ontevredenovermezelf	1.36	6.545	.690	.525	.862

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
1.78	9.660	3.108	6

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.553[a]	.486	.621	8.409	159	795
Average Measures	.881[c]	.850	.908	8.409	159	795

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Sadness – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.819	.834	5

Item Statistics

	Mean	Std. Deviation	N
Verdrietig	.37	.724	160
Treurig	.43	.714	160
Neergeslagen	.47	.800	160
Alleen	.92	1.052	160
Eenzaam	.64	.813	160

Inter-Item Correlation Matrix

	Verdrietig	Treurig	Neergeslagen	Alleen	Eenzaam
Verdrietig	1.000	.766	.645	.321	.432
Treurig	.766	1.000	.618	.323	.484
Neergeslagen	.645	.618	1.000	.292	.418
Alleen	.321	.323	.292	1.000	.716
Eenzaam	.432	.484	.418	.716	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Verdrietig	2.45	6.928	.665	.637	.772
Treurig	2.39	6.932	.676	.634	.770
Neergeslagen	2.35	6.858	.593	.464	.789
Alleen	1.90	6.191	.513	.515	.831
Eenzaam	2.18	6.489	.685	.590	.762

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
2.82	9.986	3.160	5

Intraclass Correlation Coefficient

	Intraclass	95% Confidence Interval		F Test with True Value 0			
	Correlation[b]	Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.476[a]	.402	.551	5.533	159	636	.000
Average Measures	.819[c]	.771	.860	5.533	159	636	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Fatigue – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.784	.784	4

Item Statistics

	Mean	Std. Deviation	N
Slaperig	2.31	1.172	160
Moe	2.46	1.063	160
Traag	1.23	1.165	160
Soezerig	1.33	1.119	160

Inter-Item Correlation Matrix

	Slaperig	Moe	Traag	Soezerig
Slaperig	1.000	.799	.501	.368
Moe	.799	1.000	.460	.308
Traag	.501	.460	1.000	.421
Soezerig	.368	.308	.421	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Slaperig	5.01	6.711	.712	.667	.664
Moe	4.86	7.415	.667	.643	.694
Traag	6.09	7.444	.567	.324	.743
Soezerig	5.99	8.358	.432	.210	.807

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
7.32	12.407	3.522	4

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value (		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.475[a]	.395	.556	4.625	159	47
Average Measures	.784[c]	.723	.834	4.625	159	47

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Shyness – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.445	.468	4

Item Statistics

	Mean	Std. Deviation	N
Verlegen	.58	.739	160
Bedeesd	1.24	.961	160
Schaapachtig	.91	1.063	160
Timide	1.27	1.056	160

Inter-Item Correlation Matrix

	Verlegen	Bedeesd	Schaapachtig	Timide
Verlegen	1.000	.291	.150	.234
Bedeesd	.291	1.000	-.070	.370
Schaapachtig	.150	-.070	1.000	.107
Timide	.234	.370	.107	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Verlegen	3.41	4.017	.342	.126	.316
Bedeesd	2.76	3.632	.279	.201	.347
Schaapachtig	3.09	4.118	.077	.051	.558
Timide	2.73	3.106	.364	.167	.244

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
3.99	5.579	2.362	4

Intraclass Correlation Coefficient

	95% Confidence Interval	F Test with True Value 0

	Intraclass Correlation[b]	Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.167[a]	.093	.251	1.802	159	47
Average Measures	.445[c]	.290	.573	1.802	159	47

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

General Positive Affect – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.901	.902	10

Item Statistics

	Mean	Std. Deviation	N
Actief	1.13	.912	160
Alert	1.31	1.003	160
Oplettend	1.63	1.044	160
Enthousiast	1.00	.971	160
Opgewekt	1.35	1.017	160
Ge�nspireerd	.67	.936	160
Ge�nteresseerd	1.64	1.200	160
Trots	.79	1.004	160
Sterk	1.38	1.032	160

Vastberaden	1.27	1.074	160

Inter-Item Correlation Matrix

	Actief	Alert	Oplettend	Enthousiast	Opgewekt	Ge�nspireerd	Ge�nter
Actief	1.000	.664	.606	.547	.588	.353	
Alert	.664	1.000	.733	.516	.573	.336	
Oplettend	.606	.733	1.000	.496	.608	.389	
Enthousiast	.547	.516	.496	1.000	.637	.553	
Opgewekt	.588	.573	.608	.637	1.000	.446	
Ge�nspireerd	.353	.336	.389	.553	.446	1.000	
Ge�nteresseerd	.423	.438	.520	.631	.465	.598	
Trots	.353	.276	.329	.503	.398	.469	
Sterk	.395	.295	.409	.514	.419	.513	
Vastberaden	.388	.408	.347	.518	.420	.483	

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Actief	11.03	46.282	.653	.539	.891
Alert	10.86	45.558	.639	.648	.892
Oplettend	10.53	44.729	.673	.644	.890
Enthousiast	11.16	44.464	.757	.613	.884
Opgewekt	10.81	44.782	.691	.551	.888
Ge�nspireerd	11.49	46.302	.631	.470	.892
Ge�nteresseerd	10.53	42.867	.694	.561	.889
Trots	11.37	46.285	.580	.423	.896
Sterk	10.79	45.904	.590	.418	.895
Vastberaden	10.89	45.026	.627	.474	.893

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
12.16	55.219	7.431	10

Intraclass Correlation Coefficient

	95% Confidence Interval	F Test with True Value 0

	Intraclass Correlation[b]	Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.476[a]	.415	.543	10.086	159	143
Average Measures	.901[c]	.876	.922	10.086	159	143

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Joviality – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.919	.919	8

Item Statistics

	Mean	Std. Deviation	N
Opgewekt	1.35	1.017	160
Blij	1.58	1.006	160
Vrolijk	1.55	1.039	160
Verheugd	1.06	1.089	160
Enthousiast	1.00	.971	160
Opgewonden	.78	.963	160
Levendig	1.19	.942	160
Energiek	.98	.911	160

Inter-Item Correlation Matrix

	Opgewekt	Blij	Vrolijk	Verheugd	Enthousiast	Opgewonden	Levendig
Opgewekt	1.000	.587	.585	.601	.637	.541	.546
Blij	.587	1.000	.793	.590	.682	.483	.524
Vrolijk	.585	.793	1.000	.645	.661	.448	.585
Verheugd	.601	.590	.645	1.000	.672	.534	.498
Enthousiast	.637	.682	.661	.672	1.000	.578	.591
Opgewonden	.541	.483	.448	.534	.578	1.000	.456
Levendig	.546	.524	.585	.498	.591	.456	1.000
Energiek	.607	.524	.553	.623	.654	.560	.666

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Opgewekt	8.14	30.987	.729	.535	.908
Blij	7.91	30.891	.749	.681	.907
Vrolijk	7.94	30.424	.766	.702	.905
Verheugd	8.43	30.209	.742	.580	.907
Enthousiast	8.49	30.667	.806	.655	.902
Opgewonden	8.71	32.448	.629	.430	.916
Levendig	8.29	32.133	.680	.527	.912
Energiek	8.51	31.799	.745	.609	.907

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
9.49	40.277	6.346	8

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.586[a]	.525	.648	12.311	159	1113
Average Measures	.919[c]	.898	.936	12.311	159	1113

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Self-Assurance – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.764	.744	6

Item Statistics

	Mean	Std. Deviation	N
Trots	.79	1.004	160
Sterk	1.38	1.032	160
Zelfverzekerd	1.57	1.062	160
Brutaal	.33	.650	160
Onbevreesd	1.34	1.127	160
Gedurfd	1.07	1.065	160

Inter-Item Correlation Matrix

	Trots	Sterk	Zelfverzekerd	Brutaal	Onbevreesd	Gedurfd
Trots	1.000	.463	.359	.084	.351	.331
Sterk	.463	1.000	.481	.098	.615	.451
Zelfverzekerd	.359	.481	1.000	.086	.633	.366
Brutaal	.084	.098	.086	1.000	.064	.149
Onbevreesd	.351	.615	.633	.064	1.000	.363
Gedurfd	.331	.451	.366	.149	.363	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Trots	5.68	12.258	.475	.251	.738
Sterk	5.09	10.966	.668	.486	.685
Zelfverzekerd	4.90	11.197	.602	.437	.703
Brutaal	6.14	15.520	.129	.025	.799
Onbevreesd	5.13	10.630	.640	.527	.691
Gedurfd	5.40	11.864	.492	.254	.735

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
6.47	16.603	4.075	6

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.351[a]	.283	.426	4.246	159	795
Average Measures	.764[c]	.703	.817	4.246	159	795

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Attentiveness – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.797	.800	4

Item Statistics

	Mean	Std. Deviation	N
Alert	1.31	1.003	160
Oplettend	1.63	1.044	160
Geconcentreerd	1.98	1.073	160
Vastberaden	1.27	1.074	160

Inter-Item Correlation Matrix

	Alert	Oplettend	Geconcentreerd	Vastberaden
Alert	1.000	.733	.631	.408
Oplettend	.733	1.000	.634	.347
Geconcentreerd	.631	.634	1.000	.245
Vastberaden	.408	.347	.245	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Alert	4.88	6.156	.758	.608	.673
Oplettend	4.56	6.110	.724	.590	.687
Geconcentreerd	4.21	6.441	.614	.463	.743
Vastberaden	4.92	7.559	.376	.173	.856

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
6.19	10.933	3.307	4

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.495[a]	.416	.574	4.919	159	477
Average Measures	.797[c]	.740	.844	4.919	159	477

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Serenity – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.827	.826	3

Item Statistics

	Mean	Std. Deviation	N
Kalm	2.74	.986	160
Ontspannen	2.39	1.009	160
Opmijngemak	2.31	.940	160

Inter-Item Correlation Matrix

	Kalm	Ontspannen	Opmijngemak

Kalm	1.000	.650	.549
Ontspannen	.650	1.000	.641
Opmijngemak	.549	.641	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Kalm	4.70	3.117	.664	.453	.780
Ontspannen	5.06	2.871	.734	.538	.708
Opmijngemak	5.13	3.285	.655	.441	.788

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
7.44	6.399	2.530	3

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value (		
		Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.614[a]	.533	.687	5.764	159	31
Average Measures	.827[c]	.774	.868	5.764	159	31

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Surprise – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	160	100.0
	Excluded[a]	0	.0
	Total	160	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.778	.782	3

Item Statistics

	Mean	Std. Deviation	N
Verrast	.70	.950	160
Versteldstaan	.61	.854	160
Verwonderd	.65	.870	160

Inter-Item Correlation Matrix

	Verrast	Versteldstaan	Verwonderd
Verrast	1.000	.553	.427
Versteldstaan	.553	1.000	.654
Verwonderd	.427	.654	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Verrast	1.26	2.459	.539	.314	.791
Versteldstaan	1.35	2.367	.712	.520	.597
Verwonderd	1.31	2.531	.607	.434	.710

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
1.96	4.967	2.229	3

Intraclass Correlation Coefficient

	95% Confidence Interval	F Test with True Value 0

	Intraclass Correlation[b]	Lower Bound	Upper Bound	Value	df1	df2
Single Measures	.539[a]	.451	.622	4.511	159	31
Average Measures	.778[c]	.711	.832	4.511	159	31

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

PANAS-X/XD Analyses

General Negative Affect Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²
Time	183.326	1	183.326	23.862	< .001	0.034
Time ✻ Group	10.753	1	10.753	1.400	0.239	0.002
Residuals	921.936	120	7.683			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²
Group	10.154	1	10.154	0.288	0.593	0.002
Residuals	4236.912	120	35.308			

Note. Type III Sum of Squares

Descriptives

Descriptives

Time	Group	Mean	SD	N
Level 1	1	2.833	3.372	66
	2	2.821	3.303	56

Descriptives

Time	Group	Mean	SD	N
Level 2	1	4.152	4.849	66
	2	4.982	6.454	56

Post Hoc Tests

Post Hoc Comparisons - Time

		Mean Difference	SE	t	p_{holm}
Level 1	Level 2	-1.739	0.356	-4.885	< .001

Note. Results are averaged over the levels of: Group

General Positive Affect Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²
Time	1793.752	1	1793.752	96.515	< .001	0.120
Time ✻ Group	0.867	1	0.867	0.047	0.829	5.786e -5
Residuals	2230.236	120	18.585			

Note. Type III Sum of Squares

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²
Group	5.116	1	5.116	0.056	0.813	3.416e -4
Residuals	10947.396	120	91.228			

Note. Type III Sum of Squares

Descriptives

Descriptives

Time	Group	Mean	SD	N
Level 1	1	15.303	8.057	66
	2	14.893	8.083	56
Level 2	1	9.742	6.340	66
	2	9.571	7.073	56

Contrast Tables

Simple Contrast - Time

Comparison	Estimate	95% CI for Mean Difference Lower	Upper	SE	df	t	p
Level 2 - Level 1	-5.441	-6.538	-4.344	0.554	120	-9.824	< .001

Note. Results are averaged over the levels of: Group

Correlations

Pearson's Correlations

Variable		GNA1	GPA1	GNA2	GPA2
1. GNA1	Pearson's r	—			
	p-value	—			
2. GPA1	Pearson's r	0.151	—		
	p-value	0.096	—		
3. GNA2	Pearson's r	0.731	0.250	—	
	p-value	< .001	0.005	—	
4. GPA2	Pearson's r	0.207	0.673	0.213	—
	p-value	0.022	< .001	0.019	—

Heart Rate Variability Analyses

rMSSD Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η^2
Time	0.115[a]	2[a]	0.057[a]	1.382[a]	0.253[a]	0.002
Time ✻ Group	0.349[a]	2[a]	0.175[a]	4.207[a]	0.016[a]	0.005

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²
Residuals	8.630	208	0.041			

Note. Type III Sum of Squares

[a] Mauchly's test of sphericity indicates that the assumption of sphericity is violated (p < .05).

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²
Group	0.055	1	0.055	0.102	0.750	8.400e -4
Residuals	55.841	104	0.537			

Note. Type III Sum of Squares

Descriptives

Descriptives

Time	Group	Mean	SD	N
Baseline	Control	3.680	0.446	53
	Swearing	3.588	0.535	53
T1	Control	3.657	0.397	53
	Swearing	3.605	0.489	53
T2	Control	3.641	0.419	53
	Swearing	3.705	0.426	53

Contrast Tables

Custom Contrast - Group ✻ Time

		95% CI for Mean Difference					
Comparison	Estimate	Lower	Upper	SE	df	t	p
1	0.017	-0.061	0.095	0.040	208.000	0.425	0.671
2	0.100	0.022	0.178	0.040	208.000	2.526	0.012

Custom Contrast - Group ✻ Time

Comparison	Estimate	95% CI for Mean Difference		SE	df	t	p
		Lower	Upper				

Custom Contrast Coefficients - Group ✻ Time

Group	Time	Comparison 1	Comparison 2
Swearing	Baseline	-1	0
Control		0	0
Swearing	T1	1	-1
Control		0	0
Swearing	T2	0	1
Control		0	0

Simple Main Effects

Simple Main Effects - Time

Level of Group	Sum of Squares	df	Mean Square	F	p
Swearing	0.422	2	0.211	3.666	0.029
Control	0.041	2	0.021	0.817	0.445

Note. Type III Sum of Squares

HF HRV Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²
Time	5.614[a]	2[a]	2.807[a]	12.335[a]	< .001[a]	0.018
Time ✻ Group	0.938[a]	2[a]	0.469[a]	2.060[a]	0.130[a]	0.003
Residuals	47.338	208	0.228			

Note. Type III Sum of Squares

[a] Mauchly's test of sphericity indicates that the assumption of sphericity is violated (p < .05).

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²
Group	0.825	1	0.825	0.328	0.568	0.003
Residuals	261.739	104	2.517			

Note. Type III Sum of Squares

Descriptives

Descriptives

Time	Group	Mean	SD	N
Baseline	Control	6.553	0.978	53
	Swearing	6.357	1.125	53
T1	Control	6.280	0.848	53
	Swearing	6.120	1.005	53
T2	Control	6.128	0.999	53
	Swearing	6.178	0.997	53

Post Hoc Tests

Post Hoc Comparisons - Time

			95% CI for Mean Difference						
		Mean Difference	Lower	Upper	SE	t	Cohen's d	p_{bonf}	p_{holm}
Baseline	T1	0.256	0.097	0.414	0.066	3.899	0.379	< .001***	< .001***
	T2	0.302	0.144	0.461	0.066	4.614	0.448	< .001***	< .001***
T1	T2	0.047	-0.111	0.205	0.066	0.715	0.069	1.000	0.475

*** p < .001

Note. Cohen's d does not correct for multiple comparisons.

Post Hoc Comparisons - Time

			95% CI for Mean Difference						
		Mean Difference	Lower	Upper	SE	t	Cohen's d	p bonf	p holm

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the bonferroni method).

Note. Results are averaged over the levels of: Group

Post Hoc Comparisons - Group

			95% CI for Mean Difference						
		Mean Difference	Lower	Upper	SE	t	Cohen's d	p bonf	p holm
Swearing	Control	-0.102	-0.455	0.251	0.178	-0.572	-0.056	0.568	0.568

Note. Cohen's d does not correct for multiple comparisons.

Note. Results are averaged over the levels of: Time

Post Hoc Comparisons - Group ✻ Time

			95% CI for Mean Difference					
		Mean Difference	Lower	Upper	SE	t	p bonf	p holm
Swearing, Baseline	Control, Baseline	-0.196	-0.773	0.381	0.193	-1.013	1.000	1.000
	Swearing, T1	0.238	-0.038	0.513	0.093	2.565	0.165	0.143
	Control, T1	0.078	-0.500	0.655	0.193	0.401	1.000	1.000
	Swearing, T2	0.179	-0.096	0.454	0.093	1.935	0.816	0.598
	Control, T2	0.230	-0.348	0.807	0.193	1.188	1.000	1.000

Post Hoc Comparisons - Group ✻ Time

			95% CI for Mean Difference					
		Mean Difference	Lower	Upper	SE	t	p bonf	p holm
Control, Baseline	Swearing, T1	0.433	-0.144	1.011	0.193	2.242	0.398	0.318
	Control, T1	0.273	-0.002	0.549	0.093	2.949	0.053	0.050*
	Swearing, T2	0.375	-0.202	0.952	0.193	1.940	0.815	0.598
	Control, T2	0.425	0.150	0.701	0.093	4.591	< .001***	< .001***
Swearing, T1	Control, T1	-0.160	-0.737	0.417	0.193	-0.828	1.000	1.000
	Swearing, T2	-0.058	-0.334	0.217	0.093	-0.630	1.000	1.000
	Control, T2	-0.008	-0.585	0.569	0.193	-0.042	1.000	1.000
Control, T1	Swearing, T2	0.102	-0.475	0.679	0.193	0.526	1.000	1.000
	Control, T2	0.152	-0.123	0.427	0.093	1.641	1.000	0.920
Swearing, T2	Control, T2	0.050	-0.527	0.628	0.193	0.260	1.000	1.000

* p < .05, ** p < .01, *** p < .001

Note. P-value and confidence intervals adjusted for comparing a family of 15 estimates (confidence intervals corrected using the bonferroni method).

Simple Main Effects

Simple Main Effects - Time

Level of Group	Sum of Squares	df	Mean Square	F	p
Swearing	1.626	2	0.813	3.222	0.044
Control	4.926	2	2.463	12.142	< .001

Note. Type III Sum of Squares

LF:HF Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²
Time	5.609[a]	2[a]	2.805[a]	10.529[a]	< .001[a]	0.027
Time ∗ Group	0.542[a]	2[a]	0.271[a]	1.018[a]	0.363[a]	0.003
Residuals	55.405	208	0.266			

Note. Type III Sum of Squares

[a] Mauchly's test of sphericity indicates that the assumption of sphericity is violated (p < .05).

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²
Group	1.401	1	1.401	1.023	0.314	0.007
Residuals	142.536	104	1.371			

Note. Type III Sum of Squares

Descriptives

Descriptives

Time	Group	Mean	SD	N
Baseline	Control	0.322	0.816	53
	Swearing	0.531	0.755	53
T1	Control	0.519	0.777	53
	Swearing	0.690	0.729	53
T2	Control	0.743	0.823	53
	Swearing	0.761	0.872	53

Simple Main Effects

Simple Main Effects - Time

Level of Group	Sum of Squares	df	Mean Square	F	p
Swearing	1.460	2	0.730	2.353	0.100
Control	4.692	2	2.346	10.539	< .001

Note. Type III Sum of Squares

Post Hoc Tests

Post Hoc Comparisons - Time

			95% CI for Mean Difference						
		Mean Difference	Lower	Upper	SE	t	Cohen's d	p_{bonf}	p_{holm}
Baseline	T1	-0.177	-0.348	-0.006	0.071	-2.500	-0.243	0.040*	0.026*
	T2	-0.325	-0.496	-0.154	0.071	-4.583	-0.445	< .001***	< .001***
T1	T2	-0.148	-0.319	0.023	0.071	-2.082	-0.202	0.116	0.039*

* p < .05, *** p < .001

Note. Cohen's d does not correct for multiple comparisons.

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the bonferroni method).

Note. Results are averaged over the levels of: Group

Post Hoc Comparisons - Group

			95% CI for Mean Difference						
		Mean Difference	Lower	Upper	SE	t	Cohen's d	p_{bonf}	p_{holm}
Swearing	Control	0.133	-0.128	0.393	0.131	1.011	0.098	0.314	0.314

Post Hoc Comparisons - Time

		Mean Difference	95% CI for Mean Difference		SE	t	Cohen's d	p_{bonf}	p_{holm}
			Lower	Upper					

Note. Cohen's d does not correct for multiple comparisons.

Note. Results are averaged over the levels of: Time

Post Hoc Comparisons - Group ✻ Time

		Mean Difference	95% CI for Mean Difference		SE	t	p_{bonf}	p_{holm}
			Lower	Upper				
Swearing, Baseline	Control, Baseline	0.209	-0.251	0.669	0.155	1.352	1.000	1.000
	Swearing, T1	-0.158	-0.456	0.140	0.100	-1.577	1.000	1.000
	Control, T1	0.013	-0.447	0.473	0.155	0.083	1.000	1.000
	Swearing, T2	-0.229	-0.527	0.068	0.100	-2.287	0.348	0.279
	Control, T2	-0.211	-0.671	0.249	0.155	-1.365	1.000	1.000
Control, Baseline	Swearing, T1	-0.367	-0.827	0.093	0.155	-2.374	0.279	0.242
	Control, T1	-0.196	-0.494	0.101	0.100	-1.959	0.772	0.515
	Swearing, T2	-0.439	-0.899	0.022	0.155	-2.834	0.076	0.071
	Control, T2	-0.420	-0.718	-0.123	0.100	-4.194	< .001***	< .001***

Post Hoc Comparisons - Group ✻ Time

		Mean Difference	95% CI for Mean Difference Lower	95% CI for Mean Difference Upper	SE	t	p_{bonf}	p_{holm}
Swearing, T1	Control, T1	0.171	-0.289	0.631	0.155	1.105	1.000	1.000
	Swearing, T2	-0.071	-0.369	0.227	0.100	-0.710	1.000	1.000
	Control, T2	-0.053	-0.513	0.407	0.155	-0.343	1.000	1.000
Control, T1	Swearing, T2	-0.242	-0.702	0.218	0.155	-1.565	1.000	1.000
	Control, T2	-0.224	-0.522	0.074	0.100	-2.235	0.397	0.291
Swearing, T2	Control, T2	0.018	-0.442	0.478	0.155	0.117	1.000	1.000

** $p < .01$, *** $p < .001$

Note. P-value and confidence intervals adjusted for comparing a family of 15 estimates (confidence intervals corrected using the bonferroni method).

HR Repeated Measures ANOVA

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²
Time	110.104[a]	2[a]	55.052[a]	6.415[a]	0.002[a]	0.004
Time ✻ Group	52.780[a]	2[a]	26.390[a]	3.075[a]	0.048[a]	0.002
Residuals	1785.064	208	8.582			

Note. Type III Sum of Squares

[a] Mauchly's test of sphericity indicates that the assumption of sphericity is violated ($p < .05$).

Between Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²

Within Subjects Effects

Cases	Sum of Squares	df	Mean Square	F	p	η²
Group	87.250	1	87.250	0.349	0.556	0.003
Residuals	26008.345	104	250.080			

Note. Type III Sum of Squares

Descriptives

Descriptives

Time	Group	Mean	SD	N
Baseline	Control	78.958	9.972	53
	Swearing	81.126	10.401	53
T1	Control	78.935	9.599	53
	Swearing	79.190	9.200	53
T2	Control	78.277	8.906	53
	Swearing	78.997	8.412	53

Post Hoc Tests

Post Hoc Comparisons - Time

			95% CI for Mean Difference						
		Mean Difference	Lower	Upper	SE	t	Cohen's d	p_{bonf}	p_{holm}
Baseline	T1	0.979	0.008	1.951	0.402	2.434	0.236	0.047*	0.032*
	T2	1.405	0.434	2.377	0.402	3.493	0.339	0.002**	0.002**
T1	T2	0.426	-0.545	1.397	0.402	1.059	0.103	0.873	0.291

* p < .05, ** p < .01

Note. Cohen's d does not correct for multiple comparisons.

Note. P-value and confidence intervals adjusted for comparing a family of 3 estimates (confidence intervals corrected using the bonferroni method).

Post Hoc Comparisons - Time

			95% CI for Mean Difference						
		Mean Difference	Lower	Upper	SE	t	Cohen's d	p_{bonf}	p_{holm}

Note. Results are averaged over the levels of: Group

Post Hoc Comparisons - Group

			95% CI for Mean Difference						
		Mean Difference	Lower	Upper	SE	t	Cohen's d	p_{bonf}	p_{holm}
Swearing	Control	1.048	-2.470	4.565	1.774	0.591	0.057	0.556	0.556

Note. Cohen's d does not correct for multiple comparisons.

Note. Results are averaged over the levels of: Time

Post Hoc Comparisons - Group ✻ Time

			95% CI for Mean Difference					
		Mean Difference	Lower	Upper	SE	t	p_{bonf}	p_{holm}
Swearing, Baseline	Control, Baseline	2.168	-3.325	7.661	1.833	1.183	1.000	1.000
	Swearing, T1	1.936	0.246	3.626	0.569	3.402	0.012 *	0.011 *
	Control, T1	2.191	-3.302	7.684	1.833	1.195	1.000	1.000
	Swearing, T2	2.129	0.440	3.819	0.569	3.742	0.004**	0.004**
	Control, T2	2.850	-2.643	8.342	1.833	1.554	1.000	1.000
Control, Baseline	Swearing, T1	-0.232	-5.725	5.261	1.833	-0.126	1.000	1.000

Post Hoc Comparisons - Group ✻ Time

		Mean Difference	95% CI for Mean Difference Lower	Upper	SE	t	p bonf	p holm
	Control, T1	0.023	-1.667	1.713	0.569	0.040	1.000	1.000
	Swearing, T2	-0.039	-5.531	5.454	1.833	-0.021	1.000	1.000
	Control, T2	0.682	-1.008	2.371	0.569	1.198	1.000	1.000
Swearing, T1	Control, T1	0.255	-5.238	5.747	1.833	0.139	1.000	1.000
	Swearing, T2	0.193	-1.497	1.883	0.569	0.340	1.000	1.000
	Control, T2	0.913	-4.579	6.406	1.833	0.498	1.000	1.000
Control, T1	Swearing, T2	-0.061	-5.554	5.431	1.833	-0.033	1.000	1.000
	Control, T2	0.659	-1.031	2.349	0.569	1.158	1.000	1.000
Swearing, T2	Control, T2	0.720	-4.773	6.213	1.833	0.393	1.000	1.000

* p < .05, ** p < .01

Note. P-value and confidence intervals adjusted for comparing a family of 15 estimates (confidence intervals corrected using the bonferroni method).

Simple Main Effects

Simple Main Effects - Time

Level of Group	Sum of Squares	df	Mean Square	F	p
Swearing	147.001	2	73.500	6.960	0.001
Control	15.884	2	7.942	1.203	0.305

Note. Type III Sum of Squares

Sample Characteristics

Toronto Alexithymia Scale – 20-items

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Total	1	66	43.42	11.992	1.476
	2	56	46.16	13.520	1.807

Independent Samples Test

		Levene's Test for Equality of Variances				
		F	Sig.	t	df	Sig. (2-tailed
Total	Equal variances assumed	1.108	.295	-1.185	120	.2
	Equal variances not assumed			-1.173	111.063	.2

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
Total	Cohen's d	12.715	-.215	-.572	.142
	Hedges' correction	12.796	-.214	-.568	.141
	Glass's delta	13.520	-.202	-.560	.157

a. The denominator used in estimating the effect sizes.
Cohen's d uses the pooled standard deviation.
Hedges' correction uses the pooled standard deviation, plus a correction factor.
Glass's delta uses the sample standard deviation of the control group.

Cronbach's Alpha

TAS-20 Reliability

Case Processing Summary

		N	%
Cases	Valid	122	100.0
	Excluded[a]	0	.0
	Total	122	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.870	.866	20

Item Statistics

	Mean	Std. Deviation	N
q1_DIF_response	2.36	1.158	122
q2_DDF_response	3.03	1.212	122
q3_DIF_response	1.70	1.120	122
q4R_DDF_response	2.89	1.173	122
q5R_EOT_response	2.22	1.041	122
q6_DIF_response	2.20	1.199	122
q7_DIF_response	2.14	1.249	122
q8_EOT_response	1.86	1.070	122
q9_DIF_response	2.56	1.292	122
q10R_EOT_response	1.62	.708	122
q11_DDF_response	2.51	1.268	122
q12_DDF_response	2.33	1.529	122
q13_DIF_response	2.11	1.241	122
q14_DIF_response	2.07	1.258	122
q15_EOT_response	1.99	1.146	122
q16_EOT_response	2.16	1.206	122
q17_DDF_response	2.80	1.460	122
q18R_EOT_response	1.97	.953	122
q19R_EOT_response	1.89	.907	122
q20_EOT_response	2.28	1.268	122

	q1_DIF_response	q2_DDF_response	q3_DIF_response	q4R_DDF_response	q5R_EOT_response	q6_DIF_re... e
q1_DIF_response	1.000	.686	.295	.676	.132	
q2_DDF_response	.686	1.000	.172	.729	.138	

q3_DIF_response	.295	.172	1.000	.200	-.062	.274
q4R_DDF_response	.676	.729	.200	1.000	.123	.428
q5R_EOT_response	.132	.138	-.062	.123	1.000	.069
q6_DIF_response	.476	.399	.274	.428	.069	1.000
q7_DIF_response	.497	.341	.521	.378	.046	.500
q8_EOT_response	.308	.188	.075	.178	.317	.158
q9_DIF_response	.682	.505	.449	.522	-.013	.555
q10R_EOT_response	.288	.188	-.104	.336	.226	.111
q11_DDF_response	.432	.398	.208	.373	.083	.154
q12_DDF_response	.526	.498	.170	.464	.022	.355
q13_DIF_response	.655	.558	.245	.537	-.045	.523
q14_DIF_response	.398	.383	.208	.229	.077	.534
q15_EOT_response	.270	.220	.140	.208	.002	.254
q16_EOT_response	.149	.132	.005	.147	.064	.144
q17_DDF_response	.308	.275	-.059	.329	.150	.185
q18R_EOT_response	.093	.022	.115	.137	.091	.042
q19R_EOT_response	.163	.063	-.073	.198	.358	.142
q20_EOT_response	.258	.118	.235	.127	-.035	.343

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronba Item

q1_DIF_response	42.32	140.352	.748	.677
q2_DDF_response	41.65	142.908	.615	.679
q3_DIF_response	42.98	152.463	.307	.467
q4R_DDF_response	41.80	142.991	.637	.682
q5R_EOT_response	42.46	157.259	.149	.325
q6_DIF_response	42.48	144.235	.575	.517
q7_DIF_response	42.54	143.655	.568	.560
q8_EOT_response	42.82	150.694	.395	.349
q9_DIF_response	42.12	137.943	.745	.733
q10R_EOT_response	43.06	155.360	.360	.431
q11_DDF_response	42.17	145.416	.497	.403
q12_DDF_response	42.35	137.585	.622	.502
q13_DIF_response	42.57	139.554	.720	.693
q14_DIF_response	42.61	145.512	.498	.476
q15_EOT_response	42.69	149.687	.400	.313
q16_EOT_response	42.52	154.086	.223	.170
q17_DDF_response	41.89	146.350	.389	.394
q18R_EOT_response	42.71	156.537	.200	.349
q19R_EOT_response	42.79	155.475	.262	.367
q20_EOT_response	42.40	150.027	.341	.308

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
44.68	162.219	12.737	20

Intraclass Correlation Coefficient

	Intraclass	95% Confidence Interval		F Test with	
	Correlation[b]	Lower Bound	Upper Bound	Value	df1
Single Measures	.251[a]	.201	.313	7.693	121
Average Measures	.870[c]	.834	.901	7.693	121

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Difficulties in Emotion Regulation

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Total	1	66	90.76	25.077	3.087
	2	56	90.30	22.391	2.992

Independent Samples Test

		Levene's Test for Equality of Variances				
		F	Sig.	t	df	Sig. (2-tailed
Total	Equal variances assumed	1.665	.199	.105	120	.9
	Equal variances not assumed			.106	119.672	.9

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
Total	Cohen's d	23.883	.019	-.337	.375
	Hedges' correction	24.034	.019	-.335	.373
	Glass's delta	22.391	.020	-.336	.376

a. The denominator used in estimating the effect sizes.

Cohen's d uses the pooled standard deviation.

Hedges' correction uses the pooled standard deviation, plus a correction factor.

Glass's delta uses the sample standard deviation of the control group.

Cronbach's Alpha

Case Processing Summary

		N	%
Cases	Valid	122	100.0
	Excluded[a]	0	.0
	Total	122	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.936	.936	36

Item Statistics

	Mean	Std. Deviation	N
q1R_response	2.29	.983	122
q2R_response	2.20	1.067	122
q3_response	2.54	1.227	122
q4_response	1.88	.992	122
q5_response	2.23	1.177	122
q6R_response	2.16	1.086	122
q7R_response	2.64	1.114	122
q8R_response	1.97	1.067	122
q9_response	2.30	1.089	122
q10R_response	2.73	1.266	122
q11_response	2.79	1.338	122
q12_response	2.77	1.347	122
q13_response	3.29	1.182	122
q14_response	2.00	1.164	122
q15_response	2.28	1.180	122
q16_response	2.31	1.260	122
q17R_response	2.50	1.194	122
q18_response	3.38	1.152	122
q19_response	2.05	1.246	122
q20R_response	3.21	1.108	122
q21_response	2.52	1.338	122
q22R_response	2.82	1.099	122
q23_response	2.62	1.462	122
q24R_response	2.63	1.151	122
q25_response	2.27	1.305	122
q26_response	3.32	1.152	122
q27_response	2.19	1.167	122
q28_response	2.20	1.162	122
q29_response	2.76	1.343	122
q30_response	2.50	1.338	122
q31_response	2.22	1.102	122
q32_response	1.77	1.066	122

q33_response	3.23	1.134	122
q34R_response	2.97	1.199	122
q35_response	2.51	1.078	122
q36_response	2.52	1.261	122

	q1R_response	q2R_response	q3_response	q4_response	q5
q1R_response	1.000	.487	.268	.680	
q2R_response	.487	1.000	.104	.437	
q3_response	.268	.104	1.000	.415	
q4_response	.680	.437	.415	1.000	
q5_response	.628	.423	.508	.668	
q6R_response	.528	.812	.076	.502	

q7R_response	.805	.577	.210	.700	
q8R_response	.379	.586	.102	.394	
q9_response	.476	.260	.498	.631	
q10R_response	.262	.255	-.160	.151	
q11_response	.047	.106	.524	.198	
q12_response	.206	.280	.471	.251	
q13_response	.149	.150	.274	.249	
q14_response	.166	.086	.457	.322	
q15_response	.280	-.019	.403	.262	

q16_response	.101	.026	.505	.289
q17R_response	.384	.483	.056	.380
q18_response	-.031	.024	.305	.135
q19_response	.144	.092	.518	.319
q20R_response	.095	.221	.158	.159
q21_response	.201	.325	.498	.372
q22R_response	.217	.208	.398	.359
q23_response	.225	.129	.538	.401

q24R_response	.167	.163	.406	.257	
q25_response	.145	.168	.481	.351	
q26_response	-.067	.000	.315	.100	
q27_response	.061	-.005	.482	.227	
q28_response	.254	.207	.452	.437	
q29_response	.303	.317	.495	.400	
q30_response	.229	.130	.453	.358	
q31_response	.215	.059	.436	.282	

q32_response	.189	.107	.500	.317
q33_response	.089	-.101	.367	.143
q34R_response	.113	.341	.136	.163
q35_response	.220	.052	.365	.283
q36_response	.086	-.030	.512	.210

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cro
q1R_response	88.26	544.922	.433	.813	
q2R_response	88.34	546.145	.370	.794	
q3_response	88.01	527.364	.654	.695	
q4_response	88.67	537.197	.599	.742	
q5_response	88.32	529.806	.638	.721	
q6R_response	88.39	544.950	.387	.845	
q7R_response	87.91	541.967	.435	.835	
q8R_response	88.58	548.774	.317	.648	
q9_response	88.25	536.340	.560	.604	
q10R_response	87.82	565.240	-.018	.425	
q11_response	87.76	527.241	.598	.713	

q12_response	87.78	529.000	.564	.703	
q13_response	87.26	533.286	.569	.715	
q14_response	88.55	530.167	.638	.798	
q15_response	88.27	533.356	.569	.661	
q16_response	88.24	527.902	.626	.703	
q17R_response	88.05	548.196	.289	.499	
q18_response	87.17	536.706	.519	.717	
q19_response	88.50	526.417	.661	.865	
q20R_response	87.34	544.572	.386	.516	
q21_response	88.03	522.908	.671	.832	
q22R_response	87.73	543.207	.417	.578	
q23_response	87.93	520.928	.640	.724	
q24R_response	87.92	542.357	.412	.459	
q25_response	88.28	523.641	.677	.766	
q26_response	87.23	539.616	.464	.718	
q27_response	88.36	532.299	.596	.836	
q28_response	88.35	526.941	.702	.713	
q29_response	87.79	521.805	.687	.769	
q30_response	88.05	521.766	.691	.737	
q31_response	88.33	531.545	.649	.686	
q32_response	88.78	533.430	.633	.821	
q33_response	87.32	538.418	.495	.686	
q34R_response	87.58	553.601	.190	.439	
q35_response	88.04	538.535	.521	.654	
q36_response	88.03	535.900	.484	.629	

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
90.55	565.754	23.786	36

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with Tru		
		Lower Bound	Upper Bound	Value	df1	
Single Measures	.290[a]	.239	.352	15.670	121	
Average Measures	.936[c]	.919	.951	15.670	121	

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the der

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

COPE Inventory – Focus On and Venting of Emotions Subscale

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Total	1	66	11.50	2.862	.352
	2	56	12.27	2.747	.367

Independent Samples Tes

		Levene's Test for Equality of Variances				
		F	Sig.	t	df	Sig. (2
Total	Equal variances assumed	.100	.752	-1.504	120	
	Equal variances not assumed			-1.509	118.161	

Independent Samples Effect Sizes

		Standardizer[a]	Point Estimate	95% Confidence Interval	
				Lower	Upper
Total	Cohen's d	2.810	-.273	-.630	.085
	Hedges' correction	2.828	-.272	-.627	.085
	Glass's delta	2.747	-.280	-.638	.082

a. The denominator used in estimating the effect sizes.

Cohen's d uses the pooled standard deviation.

Hedges' correction uses the pooled standard deviation, plus a correction factor.

Glass's delta uses the sample standard deviation of the control group.

Cronbach's Alpha

Case Processing Summary

		N	%
Cases	Valid	122	100.0
	Excluded[a]	0	.0
	Total	122	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.658	.657	4

Item Statistics

	Mean	Std. Deviation	N
3_response	2.46	1.092	122
17_response	2.87	.953	122

28_response	2.66	.959	122
46_response	2.40	.976	122

Inter-Item Correlation Matrix

	3_response	17_response	28_response	46_response
3_response	1.000	.439	.299	.322
17_response	.439	1.000	.096	.324
28_response	.299	.096	1.000	.463
46_response	.322	.324	.463	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
3_response	7.93	4.425	.484	.266	.558
17_response	7.52	5.243	.388	.246	.623
28_response	7.73	5.257	.379	.255	.629
46_response	7.99	4.735	.507	.299	.543

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
10.39	7.844	2.801	4

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.325[a]	.232	.425	2.924	121	363	<.001
Average Measures	.658[c]	.547	.747	2.924	121	363	<.001

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Appendix S – Cronbach's Alpha for PANAS-X Scales

Fundamental Needs and Mood Questionnaire

Self-esteem

Case Processing Summary

		N	%
Cases	Valid	381	100.0
	Excluded[a]	0	.0
	Total	381	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.778	3

Belonging

Case Processing Summary

		N	%
Cases	Valid	381	100.0
	Excluded[a]	0	.0
	Total	381	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.774	3

Control

Case Processing Summary

		N	%
Cases	Valid	381	100.0
	Excluded[a]	0	.0
	Total	381	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.694	3

Meaningfulness

Case Processing Summary

		N	%
Cases	Valid	381	100.0
	Excluded[a]	0	.0
	Total	381	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	N of Items
.357	2

PANAS-X Scales

General Negative Affect – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	227	100.0
	Excluded[a]	0	.0
	Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.721	.726	9

Item Statistics

	Mean	Std. Deviation	N
Afraid	1.03	1.358	227
Scared	.72	1.056	227
Nervous	.84	1.094	227
Guilty	.47	.874	227
Ashamed	.93	1.262	227
Irritable	.81	1.061	227
Hostile	.52	.970	227
Upset	.56	1.000	227
Distressed	.55	.969	227

Inter-Item Correlation Matrix

	Afraid	Scared	Nervous	Guilty	Ashamed	Irritable	Hostile	Upset	Distressed
Afraid	1.000	.737	.286	.182	.337	.001	.099	.254	-.097

Scared	.737	1.000	.386	.245	.393	.056	.221	.241	.021
Nervous	.286	.386	1.000	.111	.104	.181	.328	.364	.216
Guilty	.182	.245	.111	1.000	.530	.457	.461	-.002	.076
Ashamed	.337	.393	.104	.530	1.000	.211	.285	-.034	-.122
Irritable	.001	.056	.181	.457	.211	1.000	.391	.239	.267
Hostile	.099	.221	.328	.461	.285	.391	1.000	.271	.210
Upset	.254	.241	.364	-.002	-.034	.239	.271	1.000	.293
Distressed	-.097	.021	.216	.076	-.122	.267	.210	.293	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Afraid	5.39	22.213	.410	.582	.697
Scared	5.70	22.554	.562	.609	.667
Nervous	5.58	23.501	.435	.281	.690
Guilty	5.95	24.524	.464	.475	.688
Ashamed	5.50	23.180	.373	.394	.703
Irritable	5.61	24.363	.365	.328	.702
Hostile	5.90	23.752	.488	.357	.682
Upset	5.87	24.797	.352	.296	.704
Distressed	5.88	26.781	.158	.201	.734

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
6.42	29.307	5.414	9

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.223[a]	.180	.274	3.589	226	1808	.000
Average Measures	.721[c]	.664	.773	3.589	226	1808	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Fear – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	227	100.0
	Excluded[a]	0	.0
	Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.709	.718	6

Item Statistics

	Mean	Std. Deviation	N
Afraid	1.03	1.358	227
Scared	.72	1.056	227
Frightened	.29	.755	227
Nervous	.84	1.094	227
Jittery	.64	.922	227
Shaky	.83	1.088	227

Inter-Item Correlation Matrix

	Afraid	Scared	Frightened	Nervous	Jittery	Shaky
Afraid	1.000	.737	.177	.286	.041	.252
Scared	.737	1.000	.281	.386	.064	.236
Frightened	.177	.281	1.000	.496	.391	.189
Nervous	.286	.386	.496	1.000	.317	.097
Jittery	.041	.064	.391	.317	1.000	.518

Shaky	.252	.236	.189	.097	.518	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Afraid	3.33	10.504	.474	.555	.665
Scared	3.64	11.285	.581	.591	.625
Frightened	4.07	13.469	.448	.322	.676
Nervous	3.52	11.897	.455	.356	.665
Jittery	3.71	13.223	.365	.416	.691
Shaky	3.52	12.472	.373	.351	.691

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
4.36	16.523	4.065	6

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.289[a]	.233	.350	3.438	226	1130	.000
Average Measures	.709[c]	.646	.764	3.438	226	1130	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Hostility – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	227	100.0
	Excluded[a]	0	.0
	Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.637	.657	6

Item Statistics

	Mean	Std. Deviation	N
Angry	.60	1.001	227
Irritable	.81	1.061	227
Hostile	.52	.970	227
Scornful	1.27	1.267	227
Disgusted	.89	1.160	227
Loathing	.84	1.057	227

Inter-Item Correlation Matrix

	Angry	Irritable	Hostile	Scornful	Disgusted	Loathing
Angry	1.000	.356	.478	.229	-.053	.514
Irritable	.356	1.000	.391	.275	-.150	.294
Hostile	.478	.391	1.000	.276	.083	.525
Scornful	.229	.275	.276	1.000	-.121	.564
Disgusted	-.053	-.150	.083	-.121	1.000	-.029
Loathing	.514	.294	.525	.564	-.029	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Angry	4.34	10.995	.486	.357	.553
Irritable	4.13	11.510	.360	.235	.597
Hostile	4.42	10.608	.581	.391	.520
Scornful	3.67	10.461	.385	.351	.589

Disgusted	4.05	14.608	-.082	.062	.755
Loathing	4.10	9.844	.643	.531	.486

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
4.94	15.222	3.902	6

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.227[a]	.175	.286	2.758	226	1130	.000
Average Measures	.637[c]	.559	.706	2.758	226	1130	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Guilt – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	227	100.0

	Excluded[a]	0	.0
	Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.721	.717	6

Item Statistics

	Mean	Std. Deviation	N
Guilty	.47	.874	227
Ashamed	.93	1.262	227
Blameworthy	.71	1.157	227
Angryatself	.64	1.056	227
Disgustedwithself	.43	.840	227
Dissatisfiedwithself	.46	1.005	227

Inter-Item Correlation Matrix

	Guilty	Ashamed	Blameworthy	Angryatself	Disgustedwithself	Dissatisfiedwithself

Guilty	1.000	.530	.554	.547	.110	.136
Ashamed	.530	1.000	.476	.471	-.120	-.004
Blameworthy	.554	.476	1.000	.691	.081	.189
Angryatself	.547	.471	.691	1.000	.153	.238
Disgustedwithself	.110	-.120	.081	.153	1.000	.396
Dissatisfiedwithself	.136	-.004	.189	.238	.396	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Guilty	3.17	11.875	.614	.434	.643
Ashamed	2.71	11.196	.420	.385	.699
Blameworthy	2.93	10.202	.649	.534	.614
Angryatself	3.00	10.491	.692	.544	.605
Disgustedwithself	3.21	14.628	.156	.200	.753
Dissatisfiedwithself	3.18	13.485	.250	.196	.739

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
3.64	16.338	4.042	6

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.301[a]	.245	.363	3.581	226	1130	.000
Average Measures	.721[c]	.660	.773	3.581	226	1130	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Sadness – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	227	100.0
	Excluded[a]	0	.0
	Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items

.676	.678	5

Item Statistics

	Mean	Std. Deviation	N
Sad	1.26	1.372	227
Blue	.62	.944	227
Downhearted	.64	.907	227
Alone	1.24	1.229	227
Lonely	1.31	1.308	227

Inter-Item Correlation Matrix

	Sad	Blue	Downhearted	Alone	Lonely
Sad	1.000	.311	.113	.337	.402
Blue	.311	1.000	.286	.284	.390
Downhearted	.113	.286	1.000	.223	.285
Alone	.337	.284	.223	1.000	.333
Lonely	.402	.390	.285	.333	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Sad	3.81	9.293	.438	.228	.625

Blue	4.45	11.027	.465	.224	.617
Downhearted	4.43	12.069	.308	.131	.671
Alone	3.83	9.963	.434	.189	.623
Lonely	3.76	8.972	.530	.287	.575

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
5.07	14.836	3.852	5

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.294[a]	.234	.360	3.083	226	904	.000
Average Measures	.676[c]	.604	.738	3.083	226	904	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Shyness – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	227	100.0
	Excluded[a]	0	.0
	Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.490	.500	4

Item Statistics

	Mean	Std. Deviation	N
Shy	.58	.948	227
Bashful	1.24	1.107	227
Sheepish	.59	.952	227
Timid	.95	1.155	227

Inter-Item Correlation Matrix

	Shy	Bashful	Sheepish	Timid

Shy	1.000	.112	.236	.323
Bashful	.112	1.000	.143	.041
Sheepish	.236	.143	1.000	.346
Timid	.323	.041	.346	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Shy	2.78	4.635	.335	.128	.378
Bashful	2.12	5.034	.129	.028	.565
Sheepish	2.77	4.507	.368	.151	.349
Timid	2.41	3.995	.341	.183	.362

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
3.36	6.903	2.627	4

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.194[a]	.129	.265	1.961	226	678	<.001
Average Measures	.490[c]	.372	.590	1.961	226	678	<.001

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Fatigue – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	227	100.0
	Excluded[a]	0	.0
	Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.336	.317	4

Item Statistics

	Mean	Std. Deviation	N
Sleepy	1.34	1.322	227
Tired	1.22	1.368	227
Sluggish	.96	1.082	227
Drowsy	1.30	1.297	227

Inter-Item Correlation Matrix

	Sleepy	Tired	Sluggish	Drowsy
Sleepy	1.000	.761	.121	-.099
Tired	.761	1.000	.060	-.190
Sluggish	.121	.060	1.000	-.029
Drowsy	-.099	-.190	-.029	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Sleepy	3.48	4.145	.512	.587	-.210[a]
Tired	3.60	4.524	.388	.594	-.025[a]
Sluggish	3.86	7.039	.077	.018	.370
Drowsy	3.52	8.065	-.149	.042	.609

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
4.82	8.650	2.941	4

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.112[a]	.053	.179	1.506	226	678	<.001
Average Measures	.336[c]	.183	.467	1.506	226	678	<.001

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

General Positive Affect – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	227	100.0
	Excluded[a]	0	.0

Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.826	.834	10

Item Statistics

	Mean	Std. Deviation	N
Active	.73	1.040	227
Alert	.89	1.125	227
Attentive	1.23	1.246	227
Enthusiastic	.92	1.170	227
Excited	.72	1.013	227
Inspired	.96	1.155	227
Interested	1.17	1.261	227
Proud	.73	1.067	227
Strong	1.11	1.207	227
Determined	.79	1.060	227

Inter-Item Correlation Matrix

	Active	Alert	Attentive	Enthusiastic	Excited	Inspired	Interested	Proud	Strong	Determined
Active	1.000	.492	-.081	.523	.507	.294	.571	.412	.386	.622
Alert	.492	1.000	.009	.463	.419	.194	.481	.218	.438	.433
Attentive	-.081	.009	1.000	-.114	-.126	.000	-.219	-.135	-.158	-.110
Enthusiastic	.523	.463	-.114	1.000	.712	.397	.522	.471	.423	.446
Excited	.507	.419	-.126	.712	1.000	.430	.550	.453	.473	.418
Inspired	.294	.194	.000	.397	.430	1.000	.353	.477	.361	.348
Interested	.571	.481	-.219	.522	.550	.353	1.000	.442	.424	.550
Proud	.412	.218	-.135	.471	.453	.477	.442	1.000	.407	.493
Strong	.386	.438	-.158	.423	.473	.361	.424	.407	1.000	.388
Determined	.622	.433	-.110	.446	.418	.348	.550	.493	.388	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Active	8.51	40.605	.660	.520	.796
Alert	8.35	41.194	.552	.409	.806
Attentive	8.01	51.531	-.148	.096	.876
Enthusiastic	8.33	39.123	.679	.578	.792
Excited	8.52	40.569	.685	.585	.795
Inspired	8.28	41.741	.493	.318	.812
Interested	8.07	38.742	.643	.510	.795
Proud	8.52	41.534	.565	.423	.805

Strong	8.14	40.596	.545	.362	.807
Determined	8.45	40.762	.632	.498	.799

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
9.24	50.432	7.102	10

Intraclass Correlation Coefficient

	Intraclass	95% Confidence Interval		F Test with True Value 0			
	Correlation[b]	Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.322[a]	.274	.376	5.747	226	2034	.000
Average Measures	.826[c]	.790	.858	5.747	226	2034	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Joviality – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

	N	%

Cases	Valid	227	100.0
	Excluded[a]	0	.0
	Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.830	.828	8

Item Statistics

	Mean	Std. Deviation	N
Cheerful	1.37	.914	227
Happy	1.20	1.176	227
Joyful	.89	1.071	227
Delighted	.91	1.181	227
Enthusiastic	.92	1.170	227
Excited	.72	1.013	227
Lively	.67	1.065	227
Energetic	1.51	1.315	227

Inter-Item Correlation Matrix

	Cheerful	Happy	Joyful	Delighted	Enthusiastic	Excited	Lively	Energetic
Cheerful	1.000	.062	.045	.163	-.091	-.002	.063	.149
Happy	.062	1.000	.653	.523	.536	.471	.654	.156
Joyful	.045	.653	1.000	.583	.660	.580	.625	.346
Delighted	.163	.523	.583	1.000	.504	.459	.542	.341
Enthusiastic	-.091	.536	.660	.504	1.000	.712	.571	.217
Excited	-.002	.471	.580	.459	.712	1.000	.574	.231
Lively	.063	.654	.625	.542	.571	.574	1.000	.193
Energetic	.149	.156	.346	.341	.217	.231	.193	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Cheerful	6.81	34.877	.079	.084	.859
Happy	6.98	27.230	.648	.544	.797
Joyful	7.29	26.897	.767	.628	.782
Delighted	7.28	26.980	.668	.453	.794
Enthusiastic	7.27	27.091	.666	.625	.794
Excited	7.47	28.524	.648	.556	.799
Lively	7.52	27.684	.692	.558	.792
Energetic	6.68	30.139	.325	.182	.846

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
8.19	36.567	6.047	8

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.379[a]	.325	.437	5.872	226	1582	.000
Average Measures	.830[c]	.794	.861	5.872	226	1582	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Self-Assurance – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	227	100.0
	Excluded[a]	0	.0
	Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.737	.738	6

Item Statistics

	Mean	Std. Deviation	N
Proud	.73	1.067	227
Strong	1.11	1.207	227
Confident	1.26	1.190	227
Bold	.67	.974	227
Fearless	1.42	1.215	227
Daring	.96	1.105	227

Inter-Item Correlation Matrix

	Proud	Strong	Confident	Bold	Fearless	Daring
Proud	1.000	.407	.430	.367	.271	.262
Strong	.407	1.000	.285	.324	.274	.418

Confident	.430	.285	1.000	.306	.412	.283
Bold	.367	.324	.306	1.000	.195	.240
Fearless	.271	.274	.412	.195	1.000	.321
Daring	.262	.418	.283	.240	.321	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Proud	5.42	14.502	.520	.307	.688
Strong	5.04	13.856	.506	.295	.691
Confident	4.89	13.889	.514	.302	.688
Bold	5.48	15.702	.416	.195	.716
Fearless	4.73	14.368	.437	.226	.712
Daring	5.19	14.789	.454	.235	.706

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
6.15	19.862	4.457	6

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig

Single Measures	.319[a]	.262	.381	3.809	226	1130	.000
Average Measures	.737[c]	.681	.787	3.809	226	1130	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Attentiveness – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	227	100.0
	Excluded[a]	0	.0
	Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.396	.427	4

Item Statistics

	Mean	Std. Deviation	N
Attentive	1.23	1.246	227
Alert	.89	1.125	227
Concentrating	1.49	1.217	227
Determined	.79	1.060	227

Inter-Item Correlation Matrix

	Attentive	Alert	Concentrating	Determined
Attentive	1.000	.009	-.289	-.110
Alert	.009	1.000	.459	.433
Concentrating	-.289	.459	1.000	.441
Determined	-.110	.433	.441	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Attentive	3.17	7.299	-.169	.110	.705
Alert	3.51	4.127	.507	.297	-.010[a]
Concentrating	2.91	4.709	.288	.351	.245
Determined	3.61	4.707	.409	.262	.130

a. The value is negative due to a negative average covariance among items. This violates reliability model assumptions. You may want to check item codings.

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
4.40	7.710	2.777	4

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.141[a]	.079	.209	1.655	226	678	<.001
Average Measures	.396[c]	.256	.515	1.655	226	678	<.001

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Serenity – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	227	100.0
	Excluded[a]	0	.0

Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.809	.810	3

Item Statistics

	Mean	Std. Deviation	N
Calm	1.48	1.443	227
Relaxed	1.85	1.368	227
Atease	1.05	1.280	227

Inter-Item Correlation Matrix

	Calm	Relaxed	Atease
Calm	1.000	.561	.698
Relaxed	.561	1.000	.502
Atease	.698	.502	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Calm	2.90	5.268	.724	.547	.667
Relaxed	2.53	6.303	.579	.339	.819
Atease	3.33	6.171	.682	.505	.718

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
4.38	12.149	3.486	3

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.586[a]	.516	.651	5.247	226	452	.000
Average Measures	.809[c]	.762	.849	5.247	226	452	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Surprise – Cronbach's Alpha & Descriptive Statistics

Case Processing Summary

		N	%
Cases	Valid	227	100.0
	Excluded[a]	0	.0
	Total	227	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.754	.806	3

Item Statistics

	Mean	Std. Deviation	N
Surprise	2.55	2.371	227
Amazed	.63	.966	227
Astonished	1.00	1.131	227

Inter-Item Correlation Matrix

	Surprise	Amazed	Astonished
Surprise	1.000	.661	.793
Amazed	.661	1.000	.286
Astonished	.793	.286	1.000

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Surprise	1.63	2.837	.912	.835	.441
Amazed	3.55	11.152	.566	.590	.763
Astonished	3.18	9.582	.697	.730	.632

Scale Statistics

Mean	Variance	Std. Deviation	N of Items
4.18	15.739	3.967	3

Intraclass Correlation Coefficient

	Intraclass Correlation[b]	95% Confidence Interval		F Test with True Value 0			
		Lower Bound	Upper Bound	Value	df1	df2	Sig
Single Measures	.505[a]	.429	.578	4.057	226	452	.000
Average Measures	.754[c]	.692	.804	4.057	226	452	.000

Two-way mixed effects model where people effects are random and measures effects are fixed.

a. The estimator is the same, whether the interaction effect is present or not.

b. Type C intraclass correlation coefficients using a consistency definition. The between-measure variance is excluded from the denominator variance.

c. This estimate is computed assuming the interaction effect is absent, because it is not estimable otherwise.

Descriptive statistics

Report

	GNA	GPA	Fear	Hostility	Guilt	Sadness	Shyness	Fatigue	Joviality	SelfAssuredness	Attentiveness	Serenity	Surprise
Mean	6.42	9.24	4.36	4.94	3.64	5.07	3.36	4.82	8.19	6.15	4.40	4.38	2.55
N	227	227	227	227	227	227	227	227	227	227	227	227	227
Std. Deviation	5.414	7.102	4.065	3.902	4.042	3.852	2.627	2.941	6.047	4.457	2.777	3.486	2.371
Minimum	0	0	0	0	0	0	0	0	0	0	0	0	0
Maximum	27	33	18	17	18	17	12	12	30	19	14	12	9
Range	27	33	18	17	18	17	12	12	30	19	14	12	9
Kurtosis	.675	.486	-.022	.320	.975	-.241	-.103	-.426	1.526	-.129	.755	-.894	-.354

Skewness	.976	1.021	.814	.892	1.264	.505	.668	.481	1.298	.748	.945	.393	.683

Appendix T – Personal Correspondence with Dr Erika Rosenberg

Hi Olly:

Thank you for your patience. Here is a brief reply with some relevant research attached.

Quite a bit of research on deception discusses "masking smiles," which are cases when AU12 is present, usually without 6, with the additional presence of AUs involved in various negative emotions. Context (the conditions under which the was video taken), sequence (which AUs did the 12 follow are coincide with), and information from other emotional channels can help the researcher determine whether the 12 was masking negative affect or not.

Ekman & Friesen first described "miserable" smiles in the attached classic paper, "Felt, False, and Miserable smiles." These are smiles that include AU12 plus AU17 (FACS code 12+17, which pulls up the chin boss. AU17 is also one of several AUs people may use to suppress or control smiles. Smile controls are also involved in the smiles of embarrassment (describe in the paper by Dacher Keltner, attached).

The different emotions linked with smiling (e.g., contempt, fear, etc.) would likely be designated for facial events in which AU12 occurs with key AUs for certain negative emotions. E.g., AU20 (a lower face fear component) might occur with a 12 for a "fear-smile," a unilateral AU14 with a contempt-smile, etc. If you are not aware of the research on contempt expression, I have attached a key paper.

Social smiles. This category emerged to distinguish, conceptually at least, some of the reasons why people might smile other than pure enjoyment. Typically, social smiles are AU12 alone, without 6, that occur for a variety of reasons. As for the various versions of social smiles he lists here, I think these various sub-categories (e.g., qualifier) are Paul's ideas on the matter that have not been studied, though I cannot be sure. This is a blog, not a scientific paper, so perhaps he felt free to offer a combination of research findings and his ideas.

I wish you good luck with your work. If you have additional questions and/or seek deeper exploration of these issues, you might consider booking an online consulting appointment with me, at this link: https://www.erikarosenberg.com/consulting

Kind Regards,

Erika L. Rosenberg, Ph.D.
http://www.erikarosenberg.com/
Founding Faculty, The Compassion Institute
https://www.compassioninstitute.com/
Center for Mind and Brain, UC Davis
http://saronlab.ucdavis.edu/people.html

Chief Scientific Officer, Humain, LTD. https://www.humain.co.uk/

See the new edition of my book with Paul Ekman, *What the Face Reveals*, *3e*. https://global.oup.com/academic/product/what-the-face-reveals-9780190202941?cc=us&lang=en&

On Aug 3, 2020, at 1:49 PM, Erika Rosenberg, Ph.D. <erika@erikarosenberg.com> wrote:

Hi Olly:

This is to confirm that I did see your email. Thanks for the follow-up.

Just so you know, I am not an employee of the Paul Ekman Group, though as Paul's protege and long time collaborator, I have agreed to handle some of their FACS-related inquiries for them. Your question extends a bit beyond FACS per se, but I would be happy to help as best I can. I have not read the blog actually, but I will take a look at it. As with a lot of blogs, Paul's reflections may well be based partly on published research and partly on his experience living in the world as a facial expression expert. I am not sure in this case, as I have not read it carefully yet. I am teaching online the rest of today, but I promise to take a good look at it and get back to you by sometime tomorrow with more information.

Thanks for your patience.

All best to you,

Erika L. Rosenberg, Ph.D.
http://www.erikarosenberg.com/
Founding Faculty, The Compassion Institute
https://www.compassioninstitute.com/
Center for Mind and Brain, UC Davis
http://saronlab.ucdavis.edu/people.html

Chief Scientific Officer, Humain, LTD. https://www.humain.co.uk/

See the new edition of my book with Paul Ekman, *What the Face Reveals,*

3e. https://global.oup.com/academic/product/what-the-face-reveals-9780190202941?cc=us&lang=en&

On Jul 29, 2020, at 2:37 AM, Olly Robertson <olly.robertson@psy.ox.ac.uk> wrote:

Dear Dr Rosenberg,

I've been sent your information from the Paul Ekman Support Group (please see below).

I am interested in action unit activation in differing smile variations. Particularly in the 18 types of smiles (e.g. contempt smile) which are outlined in this blog and in the book Telling Lies (Ekman, 1985).

I cannot see any publications documenting the specific differences. Namely, I am looking for the documentation relating to action unit activation in each of these specific smile variations. I would appreciate it if you could send me the documentation and/or publications that outline this information, and anything else you think would be useful or important.

Many thanks,

Olly Robertson

From: Paul Ekman Group Support (Ekman Group) <custserv@paulekman.com>
Sent: 28 July 2020 22:26
To: Olly Robertson <olly.robertson@psy.ox.ac.uk>
Subject: Re: Action Unit Information relating to Smiles

Hello Olly,

Thanks for contacting us. You can find more information about Facial Action Coding System (FACS) here. For further questions regarding the FACS Manual or Test, including help with understanding specific AUs and scoring, we kindly request that you reach out to our consulting partner and professional FACS trainer, Erika Rosenberg. You may find her contact information here.

Best,

Paul Ekman Group

On Sun, Jul 26, 2020 at 6:55 AM, Olly Robertson <olly.robertson@psy.ox.ac.uk> wrote via Mail:

Good afternoon,

I am contacting you with the hopes that you can provide me with some information. I am interested in action unit activation in differing smile variations.

Professor Ekman claims that there exists 18 types of smiles [https://www.paulekman.com/blog/science-of-smiling/] but I cannot see any publications documenting the specific differences. I would appreciate it if you could send me the documentation and/or publications that outline the specific action unit configurations for the 18 smiles.

If you don't have this information, please could you sign post me on to someone who can help me.

Many thanks,

Olly Robertson

Appendix U – Personal Correspondence with Professor Lisa Feldman-Barrett

Olly Robertson
Wed 13/09/2017 18:02
To: l.barrett@northeastern.edu
Dear Dr Barrett,

I'm hoping you may be able to help me or potentially point me in the right direction. I'm a PhD student from Keele University in the UK. My research is investigating the way that speech regulates our emotions in response to every day experiences within normative populations. I'm planning a series of experimental studies which will require a self-report measure taken at three time points as part of a multimodal measurement approach. The aim is to measure an emotional experience pre-stressor, immediately post-stressor, and post-intervention.

I am using the theory of constructed emotion as an underpinning framework for my research but I am struggling to find any self-report measures which are informed by said theory. I was wondering if you may be able to advise on this, or perhaps suggest any avenues of inquiry. I was intending to use the PANAS but the research team were unsure of whether this was too rooted in basic emotion theory to be reconcilable with the theory of constructed emotion. Any advice or input you could offer would be greatly appreciated.

Thank you for your time. I hope to hear from you in the future.

Olly Robertson
PhD Candidate

01782 734402
Room 1.23
Dorothy Hodgkin Building
Keele University

Lisa Feldman Barrett <l.barrett@northeastern.edu>

Wed 13/09/2017 19:19

To: Olly Robertson <o.m.robertson@keele.ac.uk>

PANAS-X.doc
28 KB

Dear Olly

thank you for your email.

I typically use the extended version of the PANAS with items added to measure affect. You can use the items in a variety of ways -- you need not compute the scales.

To see the items, see Barrett, L. F., & Russell, J. A. (1998). Independence and bipolarity in the structure of current affect. *Journal of Personality and Social Psychology*, 74, 967-984.

Here is an example of the questionnaire (attached)

Good luck with your dissertation.

Best wishes

Lisa