Two-Player Game: Playing Casual Video Games with Outgroup Members Reduces Levels of Prejudice Towards that Outgroup

Chris Stiff and Tom Bowen

Keele University

Author note

This research was carried out within the School of Psychology and the Humanities and Social Sciences Research Institute at Keele University, and the authors would like to thank them for their support.

The authors declare that there are no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Word count: 5638

Correspondence address:

Chris Stiff, School of Psychology, Keele University, Staffordshire, ST5 5BG, UK

Email: c.stiff@keele.ac.uk

Abstract

Video games have traditionally held a dubious reputation in the media and have been linked to many anti-social behaviours. A large amount of research has borne out some of these concerns, linking video games with addiction and particularly aggression. However, recent work in this area has begun to examine the positive aspects of video gaming. In this work, we examine how playing casual, low-involvement videogames with an outgroup member may reduce *prejudice.* In Study 1, participants played cooperatively or competitively with a (trivial) outgroup member or alone. In Studies 2 and 3, a meaningful social identity was used: students' university affiliation. Participants either played cooperatively with a rival university student against the computer, or alone. All three Studies showed attitudes towards the outgroup were more positive after playing with an outgroup member compared with control conditions. How these findings may be applied to real world groups and extensions for future research are then discussed.

KEYWORDS: Videogames; prejudice; outgroup; social identity

1. Introduction

1. 1 The dark side of video games

Since the release of *Pong* in 1972, video games have enjoyed an exorable rise in their popularity, ubiquity, and money-making ability. In the last year, the top video game studio *Bungie* made $500 million on the release day of their latest game *Destiny*, and in the previous year *Take-Two Interactive Software Inc.* accumulated $800 million for their fifth instalment of *Grand Theft Auto* (Krol, 2014). The famous Massively-Multiplayer Online Role Playing Game (MMORPG) World of Warcraft (Nagygyörgy et al., 2013; Reilly, 2014)has over 10 million subscribers and the popular cell phone game *Angry Birds* has reportedly been downloaded over 1 billion times (Takahashi, 2013).

However, this rise has not always been smooth. In the media video games are frequently linked to acts of aggression, violence, and alienation. Following the Columbine High School massacre, it was suggested that the perpetrators had fuelled their violent fantasies through playing video games (Human, 2007). Subsequently, the parents of the victims attempted to sue the makers of those games (Ward, 2001). Other media outlets have been quick to suggest an association between playing violent video games and violence in the real world (e.g. Bushman, 2013), further tarnishing their reputation.

These viewpoints have also received some empirical support. Playing violent video games has been consistently linked to increased levels of aggression in players (Hasan, Bègue, & Bushman, 2013; Hollingdale & Greitemeyer, 2014), for both adults and children (Saleem, Anderson, & Gentile, 2012), and is exacerbated over time (Barlett, Harris, & Baldassaro, 2007). The

realism of a violent game moderates this relationship; more realistic games lead to greater levels of aggression compared to those that are more fantastical (Barlett & Rodeheffer, 2009). Male players seem more susceptible to these influences that females (Polman, de Castro, & van Aken, 2008). This is unwelcome news given that males tend to be "gamers" more than females (Gilbert, 2015). As well as aggression, violent video games have also been linked with increased levels of depression if played for more than two hours a day (Tortolero et al., 2014), reduced feelings of interpersonal trust in players (Rothmund, Gollwitzer, Bender, & Klimmt, 2015), and poorer self-control abilities (Harma, Aktan, & Cagiltay, 2015).

It is not only violent video games that have been linked with adverse consequences. The issue of addiction to video games is increasingly reported in clinical literature (e.g. Van Rooij, Schoenmakers, Vermulst, Van Den Eijnden, & Van De Mheen, 2011). Schmitt and Livingston's (2015) examination of video game addiction in college students indicated that pathological levels of gaming were prevalent, and led to poorer performance in assessments. A similar effect has been found in pre-teen children, with excessive video game use leading to under-achievement in school (Skoric, Teo, & Neo, 2009). Overall, a number of findings point towards maladaptive effects that can result from video game play.

1. 2 Positive aspects of video games

On the other hand, not all findings are negative. In recent years, researchers have begun to unearth more positive aspects of video game play. First, playing video games has been shown to enhance brain function and efficiency. Wu et al. (2012) demonstrated that playing first-person-perspective shooting games ("FPS's") induced neuroplastic change and improved players'

performance on attentional tasks. Similarly, Anguera et al. (2013) found playing increased cognitive control and made participants better at multi-tasking. Although these studies have used specially modified versions of video games, Kühn, Gleich, Lorenz, Lindenberger, and Gallinat (2014) have shown analogous benefits to brain function, such as spatial navigation, planning and memory, using the commercially-available video game *Super Mario Brothers,*.

Looking beyond neuropsychological findings, video games have also been shown to be beneficial in social interactions. Playing a pro-social video game alone increases that player's pro-social emotions, such as empathy (Greitemeyer, Osswald, & Brauer, 2010). It also increases pro-social behaviour, even in tasks which are highly demanding such as assisting someone who is being harassed by another person (Greitemeyer & Osswald, 2010). These findings are robust, even when introducing a situation wherein a participant may be tempted to pursue selfish behaviour over pro-social, such as in mixed-motive dilemmas. Participants who have played with others prior to making decisions show greater cooperativeness compared with those in the control condition (Greitemeyer & Cox, 2013).

Interestingly, playing *violent* video games does not diminish this effect. Greitemeyer, Traut-Mattausch, and Osswald (2012) asked participants to play a violent game cooperatively with another person or alone, and then engage in decision dilemma task (allocating and endowment chips that were worth twice as much to a partner, whilst that partner made the same choice) with a different person. Participants allocated more, i.e. were more cooperative, after playing with another person.

Thus, video games *can* have a variety of benefits to the players and to those they interact with. Moreover, subsequent partners do not necessarily have to be those they have played with in order for these effects to hold. As such, we may posit another, as yet unexamined, social problem which video games may help to solve.

1. 3 Prejudice and stereotypes towards outgroup members

Perhaps one of the most robust and easily replicable effects in psychology is the conflict that can be created simply by splitting a group of individuals into two. According to social identity theory (Tajfel, 1978; Tajfel & Turner, 1979), individuals are motivated to enhance the groups to which they belong - the ingroup - and denigrate groups other than theirs - the outgroups - in order to maximize their self-esteem. Moreover, the nature of the groups does not need to be meaningful; although intergroup conflict often occurs between real world groups (e.g. between Hindus and Muslims; Bano & Mishra, 2009), groups can be created based on trivial or even arbitrary criteria and conflict can still occur (Reynolds et al., 2007).

The comparison between one's group and others is often manifested as prejudice towards the outgroup and the use of stereotypes towards its members. Outgroups are seen as homogenous, and a common set of (usually negative) behaviours and traits are applied to all members indiscriminately (Hamilton & Sherman, 1994). Stereotypes are damaging to intergroup relations and are difficult to dislodge; once established they tend to cause subsequent interactions to be encoded (Macrae, Stangor, & Milne, 1994) and recalled (Fyock & Stangor, 1994) in stereotype-congruent ways.

Of the many methods available to reduce intergroup conflict, one that has been shown to be highly effective is *contact* between the rival groups. Allport (1954) first postulated the Contact Hypothesis as a means of reducing prejudice between minority and majority groups. At its most basic, individuals with differing social identities would communicate with one another in order to reduce perceived homogeneity and anxiety. The improved relations between the two specific individuals should then *generalise* to their respective outgroups as a whole, leading to more positive regard overall. Contact is most productive if the interaction contains a collaborative element, with individuals working towards a common goal (rather than against each other). Groups also need to be of equal status, and supported in their contact by a surrounding infrastructure. This was exemplified in the famous "Robbers' Cave" Study (Sherif et al., 1961) wherein intergroup conflict was created in a camp of young boys by dividing their number arbitrarily into two, and then dissipated by requiring them to work together for a common purpose.

This initial work has gone on to be supported by many other studies (see Pettigrew & Tropp, 2006 for a meta-analysis). Recent work has shown that the physical presence of another partner may not be a requirement for this to work; intergroup contact can be *mediated* through indirect experience. Park (2012) reports on a number of studies which demonstrate effective prejudice reduction through the viewing of outgroup members via a television show. Researchers have also begun to examine how contact through computer-based communication can also work as a form of intergroup contact (e.g. Alvídrez, Piñeiro-Naval, Marcos-Ramos, & Rojas-Solís, 2015; Tynes, Giang, & Thompson, 2008).

Based on this, we could postulate that video games would be an ideal tool for facilitating contact. In cooperative games, two (or more) individuals work towards a common goal; moreover, games of this nature are usually constructed to foster this cooperation, and make the experience of collaboration positive and pleasant. In addition, as it is the experience of contact that is important, rather than the physical presence of the parties, video game players would not need to be in the same room (or even in close proximity at all) for the effects of play to influence their attitudes.

1.4 Videogames as a tool for reducing intergroup prejudice

Based on this idea, this paper aimed to investigate whether playing video games with a member of an outgroup can help to reduce prejudice towards that outgroup as a whole. Contact with an outgroup member facilitates prejudice reduction, and more so if that contact entails some collaborative element. Moreover, it has been demonstrated that a physical presence is *not* required for this effect to work. Thus, playing a video game with an outgroup member should have the same effect as working on collaborative task in the more conventional sense. Participant's increased favourability towards their partner should then be generalised to their partner's group as a whole.

This idea has already received some support in the literature. Vang and Fox (2013)'s that participants showed improved attitudes towards outgroup members after playing a short puzzle game alongside them in a virtual world, and Velez, Mahood, Ewoldsen, and Moyer-Gusé (2012) have demonstrated that playing cooperatively with an outgroup member increased subsequent helping behaviour. However, in the former study, group membership was given by ethnicity (e.g. Black versus White) rather than an acquired social identity, and

was directed only at that specific partner; in the latter, altruistic tendencies rather than stereotypical attitudes were measured. In this work, we aim to show a general improvement of attitudes to the outgroup *as a whole* can be caused by collaborative video game play.

In line with this idea, Adachi, Hodson, Willoughby, and Zanette (2014) examined whether playing violent videogames collaboratively could reduce prejudice between two groups. However, the games used in this study were graphic in nature, and required extreme engagement and focus from participants in order to succeed. Participants also played simultaneously, working in the same game arena at exactly the same time, using a top-of-the-line video game console (an Xbox ONE). In the video game community, there has been a marked rise in the popularity of *casual gaming* (Curtis, 2015; Ming-Chi Lee & Tzung-Ru Tsai, 2010). These are games which do not require intense concentration, are typically not violent (or excessively so), and are often asynchronous (i.e. turn-based). Users may only play occasionally, and often use a low power device such as a smartphone, tablet, or desktop PC (as opposed to a power gaming PC). Studies have found a number of personal benefits in casual gaming such as reducing stress (Whitbourne, Ellenberg, & Akimoto, 2013). In our work then, we deliberately used more casual, low intensity games that involved turn-taking, to examine whether these will still facilitate prejudice reduction. Overall, we will extend the existing work in this area, and make a unique and useful contribution to our understanding of the necessary conditions required for video games to be an effective prejudice reduction tool.

Three Studies were conducted wherein participants played a videogame with a partner who was in an outgroup. In the first Study, the group

identity was trivial and based on a minimal group paradigm (MGP). The subsequent two studies used a meaningful identity; participants' university affiliation. The first Study also used both a cooperative and competitive condition to ascertain whether simply playing *with* an outgroup member was sufficient, or if the interaction had to be cooperative. Our hypothesis for the first Study was that participants playing cooperatively with an outgroup member would subsequently show a more positive attitude towards that outgroup compared to participants playing competitively, or in a control condition.

2. Study 1

2.1 Method

2.1.1 Participants

Eighty-seven individuals (54 male) attending a northwest UK university took part in the Study in return for course credit. Participants' age ranged from 18 – 36 years (M = 22.34, SD = 1.96).

2.1.2 Design

Participants were placed in one of three conditions, 29 in each. They either played *cooperatively* with a partner, *competitively* against a partner, or played *alone.* The main dependent variable was participants' attitudes towards the outgroup after play.

2.1.3 Materials

Participants used a standard PC running Google Chrome to play the Flash-based game Zookeeper. In the game, the player is presented with an 8 x 8 grid of cartoon animal heads and is required to click on two of them that are adjacent. The two clicked icons swap places, and when three or more of the same kind appear in the same horizontal or vertical line, those icons disappear. The goal is

to “disappear” a certain quota of each animal before the timer runs out. Success moves the player onto the next, more difficult level.

Participants were also presented with a consent form and information sheet on paper before the game, and a sheet with the two attitude item measures after playing: “I would be happy to work with a member of that group again” and “I have positive feelings about members of that group”, which participants indicated agreement with on a 1 (strongly disagree) to 5 (strongly agree) scale.

2.1.4 Procedure

Participants were told they were taking part in a Study examining “working in groups”. Participants were also informed that there were two types of people taking part, and before they started they needed be classified into one of those groups. They were then shown a piece of paper with a large number of dots (approximately 100) and asked to estimate how many were there. Whatever answer participants gave, they were told they had overestimated the number, and thus were in the *overestimator* group. Other participants, they were told, had underestimated the number of dots, and would be in the *underestimator* group.

Participants were then randomly assigned to a condition. In the *cooperative* condition, participants were then told they would be playing with a partner in the next task. Both they and their partner would play the videogame Zookeeper for five minutes, and when finished their scores would be combined and placed in a leaderboard. The top five pairs in the leaderboard at the end of data gathering would then win a cash prize.

In the *competitive* condition, participants were informed they would be playing against a partner. Both players would play Zookeeper for five minutes,

and then only the player who scored the highest would be placed on the leaderboard. The other player's score would be discarded. The top five players on this leaderboard would win a cash prize.

In the *control* condition, participants were told no more data was needed from pairs, and so they would be playing alone. Their score would be compared to all others in their condition, and the top five scorers would win a cash prize.

In the cooperative and competitive conditions, participants were then designated a partner, and they were told they would be playing with an underestimator. It was emphasized that a) this was an individual in a different group to them; and b) that some participants would be playing with a member of the same group (i.e. overestimators) to heighten the distinction between the two groups. The partner was actually fictitious and participants played alone regardless of condition.

Participants were then allowed two minutes to practice on Zookeeper alone, and then played for five minutes as per their condition. At the end of this period, participants were asked to complete a short survey about their experience. Amongst dummy items, the two attitude items were included.

Participants were then asked if any aspect of the Study seemed false and if they could guess the hypotheses. None reported any suspicion and none guessed our true intentions. Participants were then debriefed and dismissed. A prize draw later awarded three cash prizes to participants at random, one in each condition.

3. Results

Participants' responses to the items "I would be happy to work with a member of the other group on another task" and I have positive feelings about

the other group" were highly correlated (r=.56, N=87, p<.01), and so were averaged to produce a single attitude measure (M=4.01, SD=0.81). This was then subjected to one-way ANOVA which yielded a significant main effect of play mode (F (2, 84)=3.52, p=.03, η^2=.08). A Levene's test showed the assumption of homogeneity of variance was met (F (2, 84)=.98, *ns*). Post-hoc Scheffe's tests indicated the control and competitive condition were in the same subset (M=3.81, SD=0.96 and M=3.91, SD=0.66 respectively). The ratings in the cooperative condition were significant higher than both other conditions (M=4.32, SD=0.71). Overall, playing cooperatively with an outgroup member led to a significantly more positive attitude towards that outgroup compared with the playing competitively or playing alone.

4. Discussion

The results from Study 1 supported the hypothesis. Participants in the cooperative condition showed more favourable attitudes not just towards their partner, but towards their partner's *outgroup* compared with the control condition. Crucially, they also showed a more favourable attitude compared with the competitive condition. This suggests that it is not sufficient to play with a partner, that play must also be collaborative in nature.

5. Study 2

Study 2 aimed to replicate and extend this finding by making a number of methodological changes. First, in Study 1, participants played entirely in isolation and their choices did not affect their (fictitious) partner. So, a different game was used in Study 2 to heighten the feeling of playing with another person. Second, to see if the same effects would occur with a more meaningful social identity the ingroup/outgroup manipulation in Study 2 used university

affiliation rather than an MGP. Furthermore, the *strength* of social identity held by participants was measured to ascertain whether this might influence their attitudes. That is, it may be that individuals who highly value their institutional membership and strongly identify with their university are less easily persuaded about the positive aspects of the outgroup. Furthermore, an individual who does *not* strongly identify with their university may not possess strong prejudices towards the outgroup in the first place. As such, their (low)level of bias towards that outgroup remains relatively unchanged by playing with a member of that group. Because of these issues, it was essential to measure strength of social identity in Study 2.

Third, the attitude measures towards the outgroup were extended by including more items to measure participants' feelings after playing. Finally, the competitive condition was removed from the design as the expected effects had been observed in Study 1. As these effects were not surprising replicating this condition seemed unnecessary.

The hypothesis remained the same, namely, that playing with an outgroup member would increase favourability towards that outgroup compared to playing alone in a control condition.

5.1 Method

5.1.1 Participants

Forty participants (24 male) attending a northwest UK university took part in return for course credit or payment of £5. The age ranged from 18 to 29 (M=23.45, SD=1.02) years. No participants had taken part in Study 1.

5.1.2 Design

Participants either played *cooperatively* with a member of the outgroup against a computer component, or played *alone* against a computer component. Participants were split equally between conditions. The main dependent variable again was participants' attitudes towards the outgroup after play.

5.1.3 Materials

Participants played the game *Worms Armageddon* purchased through Steam and installed on a standard Windows PC. In the game, players take control of a team of cartoon worms and aim to destroy the opposing team's worms using a variety of comedic weapons. It should be noted that the game has a considerably humorous aesthetic and does not contain any excessive gore. It also requires a low powered, PC, in keeping with our examination of casual games. Participants engaged in either a 2 vs. 2 game, playing with an outgroup partner against the computer (i.e. four worms in total), or a single player game, playing alone against the computer (i.e. two worms in total). Play alternates between players with all characters appearing on the same screen. Players can observe one another move, creating a more interactive environment than in Study 1. Moreover, players can hurt members of their own team and themselves with the weapons, heightening interdependence.

A social identity scale was created by combining items from Johnson, Morgeson, and Hekman (2012) and Luhtanen and Crocker (1992). Participants were asked to what extent they agreed with the following items: "I am proud to be at [ingroup university]", "I regret being at [ingroup university]", "I feel I belong at [ingroup university]", "Being a [ingroup university] student is part of my self-image", "I am glad to be at [ingroup university]", "[ingroup university] university is an important part of my identity", "I feel insulted when people

criticise [ingroup university]", "When talking about [ingroup university] students I say 'I' rather than 'we'", and "Being a [ingroup university] student is important to me" on a scale from 1 (strongly disagree) to 5 (strongly agree).

A prejudice measure was used containing the following items: "I would be happy to work with a member of that group again", "I have a positive attitude towards that group", "I like members of that group", and "I think all members of that group are different", answered on a 1 (strongly disagree) to 5 (strongly agree) Likert scale. In the alone condition, the word "again" was omitted from the first item.

Participants were also given paper consent and information forms prior to taking part, and a paper survey afterwards containing these attitude measures amongst other dummy items.

5.1.4 Procedure

Participants were told that they would be taking part in a Study measuring "working with a partner", and it would involve playing a video game with another person against computer opponents. Participants were also told that some of them would play with members of their own university and some with a member of a "rival" university. The outgroup university was one which is located within the same geographical locale and is known to have a healthy rivalry with the ingroup institution. Participants were then presented with the social identity scale (labelled "university scale" on the paper) to complete.

In the cooperative condition, participants were told they would be playing with a partner, and a pretence was made where an outgroup member was picked to be their partner, by drawing a piece of paper from a hat. In fact, all participants were designated outgroup partners, furthermore, no such partners

existed and all actions for them in the game were controlled by the computer. Participants were shown the game *Worms Armageddon* and allowed to practice for two minutes in a 1 vs 1 player game against the computer. They were then put into the main game, partnered with the (fictional) outgroup member and told they would have five minutes to play against the computer. Worm characters in the game were clearly labelled to show that the participant and the outgroup member were on the same team. The labels also indicated the players' institution to highlight they were from different universities.

In the alone condition, participants were told that no more data was needed for the "playing with a partner" condition, and so they would play alone against the computer. They were allowed a practice session and they entered a 1 vs 1 game against a computer controlled player. Assignment to either condition was random.

After five minutes play, the experimenter ended the session. Participants then completed the prejudice measure. A section at the start explained to participants that the experimenters would like some insight into how they felt about the outgroup university. Participants placed their completed survey in a small postbox, to ensure anonymity. Participants were then asked if any aspects of the Study seemed false and if they could guess the hypotheses. None voiced any suspicion or correctly guessed our true intentions. Participants were then fully debriefed, compensated, and dismissed.

6. Results

6.1 Equivalent experience across conditions

The social identity items showed high internal consistency (α=.89) and were averaged to create a single item. An independent t-test showed no

differences in social identity between cooperative and alone conditions (t (38) = 1.00, *ns;* M=3.97, SD=0.49, M=3.80*,* SD = 0.56 respectively).

6.2 Attitude to outgroup

Participants' responses to the four attitude measures showed high internal reliability (α=.71) and so were averaged to form a single attitude scale. This was then subjected to one-way ANCOVA using participants' social identity as a covariate. The Levene's test for homogeneity of variance was non-significant (F (1, 38)=1.14, *ns*). The analysis showed a significant main effect of partner identity (F (1, 37) = 5.44, p=.03, η^2=..13). Social identity was not a significant covariate (F (1, 37) = .003, *ns*) and showed homogeneity of regression slopes across conditions. Examination of the means indicated that participants showed a more favourable attitude towards the outgroup after playing cooperatively (M=3.68, SD=0.44) compared with the control condition (M=3.37, SD=0.38).

7. Discussion

The results from this Study again supported the hypothesis that playing cooperatively with an outgroup member did indeed lead to more favourable outgroup attitudes compared with a control condition, even with a meaningful social identity. Moreover, the strength of the social identity did not seem to moderate this effect.

8. Study 3

In Study 3, some further changes were introduced to extend our findings. First, some additional variables were measured to ensure equivalence between conditions. Participants' enjoyment of the game was measured, as perhaps playing with others may be more pleasant than playing alone. Similarly, the

perceived difficulty of each game was measured to ascertain if there was any difference in task complexity.

Second, the items used to measure participants' attitudes were also changed in order to ensure the true aims of the experiment were sufficiently obscured. So, rather than asking participants how they felt about working with outgroup members again, a more general survey was produced which asked about the outgroup overall, and hid those questions amongst others asking about university experiences.

As with the previous Studies, we expected that participants that played with an outgroup member would show more a positive attitude towards that outgroup after play compared with the control condition. Based on the findings of Study 2, we also expected social identity to have no influenced on the magnitude of this effect (i.e. to be a non-significant covariate).

8.1 Method

8.1.1 Participants

Forty-six participants (25 male) from a northwest UK university took part in return for course credit, or £5. Participants' age ranged from 18 – 42 years (M=21.04, SD=2.41). Participants had not taken part in either of the first two Studies.

8.1.2 Design

Participants were placed in one of two conditions, 23 in each, in the same manner as the previous Studies. Participants in the *cooperative* condition were told they were playing with a member of the outgroup university. In the *alone* condition, they played alone.

The main dependent variable was participants' attitude towards the outgroup after play.

8.1.3 Materials

The same game and apparatus as Study 2 were used here. Consent forms, attitude measure, and social identity measure were all provided on paper and completed by hand. A new prejudice scale was created using the items "I have positive feelings about [outgroup university] students", "I would happily become friends with a [outgroup university student]", "I like [outgroup university] students", "I can see [outgroup university] are all individuals with their own personalities" "I believe that [outgroup university] students are not as intelligent as [ingroup university] students", and "I believe that [outgroup university] students are an unpleasant bunch of people", on a 1 (strongly disagree) to 10 (strongly agree) Likert scale. The latter two items were reverse coded prior to analysis. The responses scale was expanded from the previous two Studies to ensure the effects found were not related to the formatting of the survey. These items were hidden amongst other items regarding "relationships with other universities" such as "I think a person's choice of university is influenced by their character" and "I enjoy meeting students from other universities". Participants were also given a feedback questionnaire containing the following items: "I had fun playing the game", "I enjoyed playing the game" (1 = strongly disagree to 5 = strongly agree), and "how difficult did you find the game to play?" (from 1=not at all, to 5= very much).

8.1.4 Procedure

The same procedure as Study 2 was followed here. As with the other Studies, labels were placed above in-game characters to emphasise their social

identities, but in reality all other turns were taken by the computer. Participants completed an expanded survey after playing to measure their attitudes, social identity, and opinion of the game. When participants were finished they were asked whether any aspect seemed false (no participants replied in the affirmative) and whether they could guess the hypotheses (no participants did). Participants were then debriefed, compensated, and dismissed.

9. Results

9.1 Equivalent experience across conditions

A one-way ANOVA was performed on participants' responses to the feedback items "I had fun playing the game" (M=3.93, SD=1.10), "I enjoyed playing the game" (M=4.22, SD=0.78), and "how difficult did you find the game to play?" (M=2.60, SD=1.32) across playing conditions. No significant differences were found between conditions (all F's <1.4).

The social identity items showed high internal consistency (α=.86) and were averaged to create a single item. One-way ANOVA showed no differences in social identity across conditions (F (2, 57) = .12, *ns*; M=3.92, SD=0.64).

9.2 Attitude to outgroup

The items measuring attitude-to-outgroup showed high internal consistency (α = .82) and so were averaged to create a single item. This was subjected to one-way ANCOVA using playing condition as the main IV, social identity as the covariate, and participants' attitudes to the outgroup as the DV. The Levene's test for homogeneity of variance was non-significant (F (1, 44) = .04, *ns*).

The analysis produced a significant main effect of playing condition (F (1, 43) = 6.41, p=.02, η^2=.13). This demonstrated that participants had more

favourable attitudes towards the outgroup after playing with a member of that group (M=7.61, SD=1.19) compared with when playing alone (M=6.72, SD=1.19). Social identity was not a significant covariate (F (1, 43) = .82, *ns*) and showed homogeneity of regression slopes across conditions.

10. Discussion

Study 3 yet again supported the hypotheses. Playing a video game with a member of the outgroup increased participants' subsequent favourability towards that outgroup. Again, social identity was not a significant covariate or moderator of this effect. In addition, enjoyment of the game and difficulty of the game were ruled out as possible mediators of the effect. Participants did not find the game any more pleasurable nor challenging when playing with others compared with when playing alone.

11. General Discussion

Previous work has shown that playing video games can have social benefits, such as increasing cooperation, but few have examined whether playing a video game with an outgroup member can improve intergroup relations. Those that have used highly engaging, graphically violent games. In this Study, we examined whether more "casual" low-key games may also lead to this reduction in outgroup prejudice. Furthermore, we examined the role of social identity strength in this relationship, and possible mediating variables.

In Study 1, participants were given a trivial social identity and played a game concurrently, rather than collaboratively, with an outgroup member. In Studies 2 and 3, a meaningful social identity - university affiliation - was used, and participants actually played alongside their outgroup partners (or were given the illusion that they were). All three Studies showed strong support for

the hypotheses. Participants recorded a more favourable attitude towards the outgroup after playing compared to a control condition. It is important to note, participants did not simply show a more positive orientation towards their *partner;* items after play referred to the outgroup *as a whole.* Thus it appears that casual, turn-based games are indeed a viable method of reducing prejudice towards an outgroup – see Table 1

Table 1

Summary of findings across all three Studies

Study number	Solo play/control	Outgroup-cooperative play	Outgroup-competitive play
1	3.81 (0.96)	4.32 (0.71)	3.91 (0.66)
2	3.37 (0.38)	3.68 (0.44)	-
3	6.72 (1.19)	7.61 (1.19)	-

Notes. Numbers in parentheses indicate SD. In Studies 2 and 3, social identity was included as a covariate in the analysis; it was not significant in either.

The latter two Studies indicated that strength of social identity was not a significant covariate in the analysis. That is, it does not seem that the effect of playing a video game with an outgroup member is different depending on whether that individual identifies strongly or weakly with their chosen group. This is a major strength of this work, and enhances the likelihood of efficacious results if these findings were applied as an intervention to reduce prejudice outside the laboratory.

11.1 Methodological issues and future work

Study 3 indicated that there were no perceived differences in the difficulty of the game across conditions, nor the enjoyment of that game. Thus, it can be surmised our effects were not the result of mediation by these variables. What then *is* the mechanism at work here? Previous work on the Contact Hypothesis has suggested a number of mediators. First, feelings of prejudice may be reduced via an attenuation of *intergroup anxiety* (Stephan & Stephan, 1985). By encountering outgroup members the "strangeness" and novelty of the contact is reduced, and thus attitudes become more favourable. Second, contact with outgroup members increases *empathy* (Swart, Hewstone, Christ, & Voci, 2011) and humanises the members, which makes stereotypes and perceived homogeneity less appropriate. Having now established considerable evidence for the effect of video games on prejudice, we would now like to delve further into whether these variables are relevant here.

There are also some other issues that require consideration. In the current work, participants did not actually interact with a member of the outgroup; all interactions were either false (in Study 1) or were controlled by the computer (in Studies 2 and 3). No participants voiced suspicion about this, so there is no reason to suspect that this influenced the findings. Nevertheless, it would be enlightening to pair ingroup members with true, human, outgroup partners to gain more insight into these dynamics. Our sample also predominately contained university-aged individuals, and was relatively small in size. The demographics of "typical" video-game players are complex; although many games are marketed towards the 18-25 year old range, there is evidence that games are popular with younger and older people as well (Jenkin, 2014). A greater age range, or deliberately focusing on certain age groups, may prove an

interesting extension of this work. Including more participants may also add to the rigor of this work; although a larger sample does not always correlate with more meaningful analysis (Neerchal, Lacayo, & Nussbaum, 2008)

This paper did not attempt to measure *behaviour* towards outgroup members after exposure through a game. This is because participants' actions in laboratory experiments such as ours are notoriously influenced by equity norms and social desirability (Gaertner & Insko, 2001; Ng, 1986). That is, participants' allocations of resources often reflect their desire to appear fair rather than their true feelings. In future, we would like to introduce a behavioural measure to these Studies which should be congruent with the attitudinal measures. However, finding such a measure that is subtle but also accurate is challenging. Indeed, this problem still exists with scale measures, albeit it to a lesser extent. Therefore, we would also like to use *implicit* measures of outgroup prejudice in subsequent Studies too. For example, an Implicit Association Test (IAT) can be used to examine unconscious prejudice towards an outgroup (e.g. Rudman, Greenwald, Mellott, & Schwartz, 1999). In our work, the group memberships used were not suitable for an IAT, as there are no artefacts that could be thought of as sufficiently "typical" of the universities used to be included as stimuli. Future Studies could use other ingroup/outgroups that would be more appropriate for use with an IAT to resolve this issue.

11.2 Conclusion

This paper aimed to extend work on prejudice reduction by demonstrating that playing a casual, low-intensity video game with a member of an outgroup can increase favourability of attitudes towards that outgroup. All three Studies supported this hypothesis. In addition, strength of social identity

did not moderate these responses. With this effect established, subsequent Studies will aim to further explore these findings, looking at how implicit attitudes and behavioural choices may also be influenced by video game interactions.

12. References

Adachi, P. J., Hodson, G., Willoughby, T., & Zanette, S. (2014). Brothers and Sisters in Arms: Intergroup Cooperation in a Violent Shooter Game Can Reduce Intergroup Bias.

Allport, G. W. (1954). *The nature of prejudice*. Cambridge, MA: Perseus Books.

Alvídrez, S., Piñeiro-Naval, V., Marcos-Ramos, M., & Rojas-Solís, J. L. (2015). Intergroup contact in computer-mediated communication: The interplay of a stereotype-disconfirming behavior and a lasting group identity on reducing prejudiced perceptions. *Computers in Human Behavior*, *52*, 533–540.

Anguera, J. A., Boccanfuso, J., Rintoul, J. L., Al-Hashimi, O., Faraji, F., Janowich, J., … Gazzaley, A. (2013). Video game training enhances cognitive control in older adults. *Nature*, *501*(7465), 97–101. http://doi.org/10.1038/nature12486

Bano, S., & Mishra, R. C. (2009). Social identity and inter-group perception of Hindu and Muslim adolescents. *Journal of Psychosocial Research*, *4*(2), 417–425.

Barlett, C. P., Harris, R. J., & Baldassaro, R. (2007). Longer you play, the more hostile you feel: Examination of first person shooter video games and aggression during video game play. *Aggressive Behavior*, *33*(6), 486–497. http://doi.org/10.1002/ab.20227

Barlett, C. P., & Rodeheffer, C. (2009). Effects of realism on extended violent and nonviolent video game play on aggressive thoughts, feelings, and physiological arousal. *Aggressive Behavior*, *35*(3), 213–224. http://doi.org/10.1002/ab.20279

Bushman, B. (2013). Opinion: Do violent video games play a role in shootings? - CNN.com. Retrieved July 3, 2015, from http://www.cnn.com/2013/09/18/opinion/bushman-video-games/index.html

Curtis, S. (2015, January 28). Sharing economy and "super casual" gaming drive app growth. Retrieved from http://www.telegraph.co.uk/technology/news/11373757/Sharing-economy-and-super-casual-gaming-drive-app-growth.html

Fyock, J., & Stangor, C. (1994). The role of memory biases in stereotype maintenance. *British Journal of Social Psychology*, *33*(3), 331–343. http://doi.org/10.1111/j.2044-8309.1994.tb01029.x

Gaertner, L., & Insko, C. A. (2001). On the measurement of social orientations in the minimal group paradigm: norms as moderators of the expression of intergroup bias. *European Journal of Social Psychology*, *31*(2), 143–154. http://doi.org/10.1002/ejsp.28

Gilbert, B. (2015). The term "gamer" is quickly becoming meaningless. Retrieved April 25, 2016, from http://uk.businessinsider.com/more-men-identify-as-gamers-than-women-2015-12

Greitemeyer, T., & Cox, C. (2013). There's no "I" in team: Effects of cooperative video games on cooperative behavior: Video games and cooperation.

European Journal of Social Psychology, *43*(3), 224–228. http://doi.org/10.1002/ejsp.1940

Greitemeyer, T., & Osswald, S. (2010). Effects of prosocial video games on prosocial behavior. *Journal of Personality and Social Psychology*, *98*(2), 211–221. http://doi.org/10.1037/a0016997

Greitemeyer, T., Osswald, S., & Brauer, M. (2010). Playing prosocial video games increases empathy and decreases schadenfreude. *Emotion*, *10*(6), 796–802. http://doi.org/10.1037/a0020194

Greitemeyer, T., Traut-Mattausch, E., & Osswald, S. (2012). How to ameliorate negative effects of violent video games on cooperation: Play it cooperatively in a team. *Computers in Human Behavior*, *28*(4), 1465–1470. http://doi.org/10.1016/j.chb.2012.03.009

Hamilton, J. W., & Sherman, S. J. (1994). Stereotypes. In R. S. Wyer Jr. & T. K. Srull (Eds.), *Handbook of Social Cognition* (pp. 1–68). Hillsadle, NJ: Erbaum.

Harma, M., Aktan, T., & Cagiltay, K. (2015). Aim, Shoot, Deplete: Playing Video Games Depletes Self-Regulatory Resources. *International Journal of Human-Computer Interaction*, *31*(7), 451–456. http://doi.org/10.1080/10447318.2015.1045243

Hasan, Y., Bègue, L., & Bushman, B. J. (2013). Violent video games stress people out and make them more aggressive. *Aggressive Behavior*, *39*(1), 64–70. http://doi.org/10.1002/ab.21454

Hollingdale, J., & Greitemeyer, T. (2014). The effect of online violent video games on levels of aggression. *Plos One*, *9*(11), e111790–e111790. http://doi.org/10.1371/journal.pone.0111790

Human, K. (2007). Study links computer denial to Columbine. Retrieved July 3, 2015, from http://www.denverpost.com/headlines/ci_6300370

Jenkin, M. (2014, July 15). Rise of the silver gamers: you don't have to be young to play video games. Retrieved May 23, 2016, from http://www.theguardian.com/society/2014/jul/15/silver-gamers-older-people-technology

Johnson, M. D., Morgeson, F. P., & Hekman, D. R. (2012). Cognitive and affective identification: Exploring the links between different forms of social identification and personality with work attitudes and behavior. *Journal of Organizational Behavior*, *33*(8), 1142–1167. http://doi.org/10.1002/job.1787

Krol, C. (2014, September 12). How video games like Destiny are making a huge profit. Retrieved from http://www.telegraph.co.uk/finance/newsbysector/mediatechnologyandtelecoms/11092000/How-video-games-like-Destiny-are-making-a-huge-profit.html

Kühn, S., Gleich, T., Lorenz, R. C., Lindenberger, U., & Gallinat, J. (2014). Playing Super Mario induces structural brain plasticity: gray matter changes resulting from training with a commercial video game. *Molecular Psychiatry*, *19*(2), 265–271.

Luhtanen, R., & Crocker, J. (1992). A Collective Self-Esteem Scale: Self-Evaluation of One's Social Identity. *Personality and Social Psychology Bulletin*, *18*(3), 302–318. http://doi.org/10.1177/0146167292183006

Macrae, C. N., Stangor, C., & Milne, A. B. (1994). Activating Social Stereotypes: A Functional Analysis. *Journal of Experimental Social Psychology*, *30*(4), 370–389. http://doi.org/10.1006/jesp.1994.1018

Ming-Chi Lee, & Tzung-Ru Tsai. (2010). What Drives People to Continue to Play Online Games? An Extension of Technology Model and Theory of Planned Behavior. *International Journal of Human-Computer Interaction*, *26*(6), 601–620. http://doi.org/10.1080/10447311003781318

Nagygyörgy, K., Urbán, R., Farkas, J., Griffiths, M. D., Zilahy, D., Kökönyei, G., … Demetrovics, Z. (2013). Typology and Sociodemographic Characteristics of Massively Multiplayer Online Game Players. *International Journal of Human-Computer Interaction*, *29*(3), 192–200. http://doi.org/10.1080/10447318.2012.702636

Neerchal, N. K., Lacayo, H., & Nussbaum, B. D. (2008). Is a Larger Sample Size Always Better? *American Journal of Mathematical and Management Sciences*, *28*(3–4), 295–307. http://doi.org/10.1080/01966324.2008.10737730

Ng, S. H. (1986). Equity, Intergroup bias and Interpersonal bias in Reward allocation. *European Journal of Social Psychology*, *16*(3), 239–255. http://doi.org/10.1002/ejsp.2420160304

Park, S.-Y. (2012). Mediated intergroup contact: concept explication, synthesis, and application. *Mass Communication and Society*, *15*(1), 136–159.

Pettigrew, T. F., & Tropp, L. R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology*, *90*(5), 751–783. http://doi.org/10.1037/0022-3514.90.5.751

Polman, H., de Castro, B. O., & van Aken, M. A. G. (2008). Experimental Study of the differential effects of playing versus watching violent video games on children's aggressive behavior. *Aggressive Behavior*, *34*(3), 256–264. http://doi.org/10.1002/ab.20245

Reilly, L. (2014, November 19). World of Warcraft Subscriptions Back Over 10 Million. Retrieved July 30, 2015, from http://uk.ign.com/articles/2014/11/20/world-of-warcraft-subscriptions-back-over-10-million

Reynolds, K. J., Turner, J. C., Haslam, S. A., Ryan, M. K., Bizumic, B., & Subasic, E. (2007). Does personality explain in-group identification and discrimination? Evidence from the minimal group paradigm. *British Journal of Social Psychology*, *46*(3), 517–539. http://doi.org/10.1348/014466606X153080

Rothmund, T., Gollwitzer, M., Bender, J., & Klimmt, C. (2015). Short- and Long-Term Effects of Video Game Violence on Interpersonal Trust. *Media Psychology*, *18*(1), 106–133. http://doi.org/10.1080/15213269.2013.841526

Rudman, L. A., Greenwald, A. G., Mellott, D. S., & Schwartz, J. L. K. (1999). Measuring the Automatic Components of Prejudice: Flexibility and Generality of the Implicit Association Test. *Social Cognition*, *17*(4), 437–465. http://doi.org/10.1521/soco.1999.17.4.437

Saleem, M., Anderson, C. A., & Gentile, D. A. (2012). Effects of prosocial, neutral, and violent video games on children's helpful and hurtful behaviors. *Aggressive Behavior*, *38*(4), 281–287. http://doi.org/10.1002/ab.21428

Schmitt, Z. L., & Livingston, M. G. (2015). Video game addiction and college performance among males: Results from a 1 year longitudinal Study. *Cyberpsychology, Behavior, and Social Networking*, *18*(1), 25–29. http://doi.org/10.1089/cyber.2014.0403

Sherif, M., Harvey, O. J., White, B. J., Hood, W. R., Sherif, C. W., & others. (1961). *Intergroup conflict and cooperation: The Robbers Cave experiment* (Vol. 10). University Book Exchange Norman, OK.

Skoric, M. M., Teo, L. L. C., & Neo, R. L. (2009). Children and Video Games: Addiction, Engagement, and Scholastic Achievement. *CyberPsychology & Behavior*, *12*(5), 567–572. http://doi.org/10.1089/cpb.2009.0079

Stephan, W. G., & Stephan, C. W. (1985). Intergroup anxiety. *Journal of Social Issues*, *41*(3), 157–175. http://doi.org/10.1111/j.1540-4560.1985.tb01134.x

Swart, H., Hewstone, M., Christ, O., & Voci, A. (2011). Affective mediators of intergroup contact: A three-wave longitudinal Study in South Africa. *Journal of Personality and Social Psychology*, *101*(6), 1221–1238. http://doi.org/10.1037/a0024450

Tajfel, H. (1978). *Differentiation between social groups: Studies in the social psychology of intergroup relations* (Vol. xv). Oxford, England: Academic Press.

Tajfel, H., & Turner, J. (1979). An integrative theory of intergroup conflic. In W. Austin & S. Worchel (Eds.), *The social psychology of intergroup relations* (pp. 33–47). Monterey, CA: Brooks/Cole.

Takahashi, D. (2013, March 28). Clash of Clans mobile gamemaker Supercell is raising more than $100M at an $800M valuation. Retrieved July 30, 2015,

from http://venturebeat.com/2013/03/28/clash-of-clans-mobile-game-maker-supercell-is-raising-more-than-100m-at-an-800m-valuation/

Tortolero, S. R., Peskin, M. F., Baumler, E. R., Cuccaro, P. M., Elliott, M. N., Davies, S. L., … Schuster, M. A. (2014). Daily Violent Video Game Playing and Depression in Preadolescent Youth. *Cyberpsychology, Behavior, and Social Networking*, *17*(9), 609–615. http://doi.org/10.1089/cyber.2014.0091

Tynes, B. M., Giang, M. T., & Thompson, G. N. (2008). Ethnic identity, intergroup contact, and outgroup orientation among diverse groups of adolescents on the Internet. *CyberPsychology & Behavior*, *11*(4), 459–465.

Van Rooij, A. J., Schoenmakers, T. M., Vermulst, A. A., Van Den Eijnden, R. J. J. M., & Van De Mheen, D. (2011). Online video game addiction: identification of addicted adolescent gamers: Online video game addiction. *Addiction*, *106*(1), 205–212. http://doi.org/10.1111/j.1360-0443.2010.03104.x

Vang, M. H., & Fox, J. (2013). Race in Virtual Environments: Competitive Versus Cooperative Games with Black or White Avatars. *Cyberpsychology, Behavior, and Social Networking*, *17*(4), 235–240. http://doi.org/10.1089/cyber.2013.0289

Velez, J. A., Mahood, C., Ewoldsen, D. R., & Moyer-Gusé, E. (2012). Ingroup versus outgroup conflict in the context of violent video game play: The effect of cooperation on increased helping and decreased aggression. *Communication Research*, 93650212456202.

Ward, M. (2001, May 1). Columbine families sue computer game makers. *BBC*. Retrieved from http://news.bbc.co.uk/1/hi/sci/tech/1295920.stm

Whitbourne, S. K., Ellenberg, S., & Akimoto, K. (2013). Reasons for Playing Casual Video Games and Perceived Benefits Among Adults 18 to 80 Years Old.

Cyberpsychology, Behavior, and Social Networking, *16*(12), 892–897. http://doi.org/10.1089/cyber.2012.0705

Wu, S., Cheng, C. K., Feng, J., D'Angelo, L., Alain, C., & Spence, I. (2012). Playing a first-person shooter video game induces neuroplastic change. *Journal of Cognitive Neuroscience*, *24*(6), 1286–1293.

Author biographies

Dr. Chris Stiff is a lecturer in the School of Psychology at Keele University, UK. He gained his undergraduate psychology degree and PhD from the University of Southampton, UK. His main research interests are pro-social behaviour, videogames, and social media interactions

Tom Bowen is a graduate from Keele University. He has obtained an BSc and MSc from the School of Psychology, and is now seeking to undertake a PhD.