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The effectiveness of an instagram intervention targeted at men to reduce body dissatisfaction

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Abstract
Instagram is a hugely popular social media website; however, research has suggested that continued use of the site may lead to increased body dissatisfaction and lower body esteem. Materials intended to reduce these effects are available, but these often focus more on thinness and are intended for use by females. Male users tend to focus more on muscularity and leanness, and so these materials may not fully address male body image issues. In this paper, we created and tested materials intended to address this gap. These materials used two principles; media literacy, which educates users about the veracity of the images they see, and cognitive restructuring, which trains user to recognise unfavourable social comparisons they may make about themselves. Across two experimental studies (study 1 N = 192; study 2 N = 301), we found these materials were effective. Participants reported greater body image esteem, and lower body dissatisfaction after viewing materials. Moreover, they seemed to operate on increasing scepticism regarding the realism of images on social media. Narcissism as an individual difference moderated these effects, showing that high narcissism precluded the need for intervention because such individuals were unaffected by Instagram exposure. Ideas for future studies, including a forthcoming longitudinal examination of these effects are then discussed.

Keywords Body image · Instagram · Intervention · Male · Social media

Introduction

Created in 2010, Instagram now boasts over one billion users worldwide (Rodriguez, 2021). Individuals use the website or app for a variety of functions including building social connections, documenting their lives, social interaction, self-promotion, exercising creativity, and voyeuristically examining the life of others (Lee et al., 2015; Sheldon & Bryant, 2016; Sheldon et al., 2017). Research on social media use has frequently examined the latter, and has showed it is often detrimental to mental health. The majority of work has looked at women, who are more inclined to experience greater pressure to conform to the "thin-ideal" of Western society where below-average body weight is seen as desirable (Nagar & Virk, 2017). Studies have shown that exposure to certain content on Facebook and Instagram led to unfavourable comparisons with their physical appearance (Baker et al., 2019) and greater body dissatisfaction (Hogue & Mills, 2019; McComb & Mills, 2021; Mills et al., 2002; see also Grabe et al., 2008). Fardouly et al. (2018) have also reported a strong correlation between Instagram use and body image concerns, with users tending to objectify themselves and judge their worth solely on their appearance. Recent meta-analyses examining social media use have highlighted that viewing idealised body-image material can be detrimental to one's own body image (de Valle et al., 2021; Fioravanti et al., 2022).

However, there is increasing evidence that these pressures are also operating on men (Agliata & Tantleff-Dunn, 2004; Hobza et al., 2007; McArdle & Hill, 2009). Between 68 and 95 per cent of adult men have reported that they experienced some kind of body disturbance (Galioto & Crowther, 2013). Males viewing idealised media images of other men also experience increased body dissatisfaction (Hargreaves & Tiggemann, 2009), increased depressive symptoms (Agliata & Tantleff-Dunn, 2004), lower self-esteem (Pan & Peña,

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2020), and disordered eating (Kaminski et al., 2005). Like women, men will often internalise the images they see in social media as the norm; however, as well as drives for thinness, men may also feel pressure to be muscular or lean (Chatzopoulou et al., 2020). The reinforcement of these unrealistic sociocultural beauty standards can influence Instagram users to make an unhealthy association between perceived norms and their outcomes, which are reinforced through likes and positive comments (Simpson & Mazzeo, 2017). As well as psychological issues, this can also lead to over-exercising (Rash, 2004), and steroid use (Wright et al., 2000).

Many of the issues listed here are caused by *social comparison;* the appraisal of ourselves against what we consider normal in society (Festinger, 1954). Social comparison can operate in an upward or downward direction. In the latter, we use exemplars that are perceived as worse than ourselves, which can increase psychological well-being. In the former, our comparator is seen as better than us, and this can be problematic. Upwards social comparison can have an aspirational component (Cramer et al., 2016) but more often than not it has negative associations with shame, envy, and resentment (Park & Baek, 2018). Engaging in social comparison in relation to one's body has been consistently shown to undermine psychological well-being (Myers & Crowther, 2009; Suls et al., 2002). Again, although the majority of this work looks at female participants, it is also prevalent in males (Hobza et al., 2007).

The use of social media can facilitate social comparison of one's body very easily. For example, Hanna et al. (2017) demonstrated that higher levels of Facebook use were related to more social comparison and *self-objectification.* Objectification refers to the idea that the images we see of others should be commented on and evaluated (Fredrickson & Roberts, 1997). S*elf-objectification* in turn involves orientating this evaluation towards oneself, engaging in continued surveillance of their own bodies, comparing with others, and feeling of shame and dissatisfaction if the comparison is unfavourable (Boursier et al., 2020).

The realism of the male body is further distorted through many users and photographers enhancing and retouching images before making them public. Instagram hosts a significant array of images that have been airbrushed or artificially altered, rather than natural (Toma & Hancock, 2010). Images in the media are often photoshopped and heavily edited to create the perfect body (Posavac et al., 2001). Using such idealised bodies inevitably leads to upward social comparison and poor psychological wellbeing (Galioto & Crowther, 2013). Research by Nightingale et al. (2017) found that more than 50 per cent of participants were unable to detect if an image had been manipulated, and even with knowledge of manipulation participants were not always able to pinpoint the adaptations.

To address these issues, two methods can be employed. First users' *media literacy* can be improved (Jeong et al., 2012; McLean et al., 2016). Here users are educated regarding the realism and veracity of the media they view to demonstrate that such media may not be true to life. This reduces the appropriateness of the images as an exemplar for social comparison and accordingly any detrimental effects. For example, Vendemia and DeAndrea (2018) found that labelling images as being "photoshopped" via a small label in the corner reduced the internalisation of the thin-ideal via those images. Similarly, Halliwell et al. (2011) showed users a video of a woman putting on makeup and having her photograph digitally altered. The participants that viewed this video had higher body satisfaction when they subsequently viewed images of models compared to those that had not. A study specifically examining Instagram by Tiggemann and Velissaris (2020) showed participants photos of models with "reality check" comments (e.g., "that isn't real"; "that's photo-shopped") or praising comments (e.g., "wow, she's gorgeous") underneath. Those that viewed the "reality check" comments had significantly higher body satisfaction compared with the other condition. Similarly, Tiggemann and Anderberg (2020) showed participants either idealised images or those images paired with the real, unedited version. The latter condition again reduced body dissatisfaction, as the images became a less useful exemplar for upward comparison. This suggests that the perceived realism of the images can be a possible mediator between an intervention and any changes in body image.

Second, *cognitive restructuring* can be used. Cognitive restructuring is a technique used with cognitive behavioural theory (CBT) and is designed to teach individuals to recognise faulty thought patterns and to replace them with new, adaptive ones (Schilder, 2002). Cognitive restructuring has been shown to be effective in a number of psychological disorders such as anxiety and depression (Clark, 2013). Furthermore, it is efficacious in body image issues. Jarry and Berardi (2004) conducted a review on 18 interventions designed to combat body image disturbance through approaches that used CBT techniques such as cognitive restructuring, and found them very effective.

However, a considerable gap in this research is that almost all studies have used female participants (Jankowski et al., 2017). There is very little insight into how they may be applied to male social media users. Moreover, there are marked differences in men and women's processing of the idealised body. Where women tend to focus on thinness, men are often more dissatisfied with their muscularity (Talbot & Mahlberg, 2021), and will use a lack of muscles as a point of mockery in others (Matera et al., 2018). Men focus

more on leanness and their muscle prominence (Gonzales & Blashill, 2021; Gültzow et al., 2020), concentrating on a mesomorphic ideal rather than a thin ideal (Gerrard et al., 2020). Obsession with this component of their bodies can lead to eating pathologies (Wei et al., 2021). This means interventions for women cannot be applied to men without considerable adjustment. Tamplin et al. (2018) found that available media literacy interventions worked for women but not men, and Pritchard and Button (2023) reported that body-positive images – which emphasise the acceptance of one's body regardless of its conformity to societal standards - are less effective on men compared with women.

Furthermore, most media literacy or cognitive restructuring programs require resources to be organised and delivered. Thus, there is a need to see whether a more expedient and easily distributable method can be used with similar effectiveness.

In the current paper, we aim to address both these issues by building a series of intervention materials that specifically address body image in men and integrate concerns regarding body image in social media. To date, little research has considered the intersection of these topics despite the massive popularity of Instagram amongst males (for the exception, see Gordon et al., 2020). Furthermore, these will be distributed online via a website, self-paced by the participant.

General overview

Overall, we expect participants body image to improve following exposure to our intervention materials.

In the first study, male participants were asked to consider their Instagram feed and the individuals they followed to engage upward social comparison processes. Their body positivity was measured and participants then viewed our intervention materials. Finally, participants' Instagram feed was considered again and their body image was measured a second time. Our hypotheses were that participants should have a more positive body image after viewing our materials, even though upward social comparison processes have been engaged (H1). Moreover, we expect these changes to occur because our intervention materials will change the perceived realism of Instagram images, in line with other such interventions. That is, the effect will be mediated by perceived realism of the images (H2).

In the second study, a more elaborate design was used. Participants viewed images provided to them – purportedly from Instagram – rather than view their own feed. A between-subjects design was used such that participants viewed our intervention materials before or after viewing the target images. Participants also rated the positivity of their body image, *and* their body dissatisfaction using a separate measure. We hypotheses that body image would improve here (H1a) and that body dissatisfaction would *decrease* (H1b) following exposure to our materials. Again, we hypothesised this would be mediated by perceived realism (H2). Finally, study 2 also used an individual difference pertinent to social media use. *Narcissism* was measured using a previously validated survey scale and incorporated in into the model. We hypotheses that this would moderate the effectiveness of our intervention materials (H3).

Study 1

Method

Participants

Power analysis in G-Power using a medium effect size ($f = 0.025$), $\alpha = 0.05$, for 80% showed 27 participants were required for this study. 213 male participants were recruited using the online crowd-sourcing site Prolific in return for a small payment. The mean age was 23.45 years (range = 18–56 years, SD = 13.23). The criterion for inclusion was participants were active users of Instagram. Participants who did not complete at least 95% of the survey, gave an age of less than 18, or gave obviously nonsensical or joke answers to open text items were removed. This left 192 participants in total in the main sample.

Design

A pre- post-test within-subjects experimental design was used. All participants were exposed to the intervention materials, and the measures were taken twice; before and after exposure. The main dependent variable was participants' state body image, where a high score indicated more positivity about their body. The perceived realism of the images in the participants' Instagram feeds was measured as a mediator.

Materials

The intervention materials consisted of 10 images. These images were created as PowerPoint slides and then transformed into images presented in the online survey. Slides contained content that was either intended to educate about the veracity of images seen online (i.e. media literacy) or to make the viewer aware of automatic comparisons and attributions they may make when viewing images (i.e. cognitive restructuring). An example of each type is presented in Figs. 1 and 2. The full collection of slides used can be found here: https://osf.io/6euwp/?view_only=c48bc342d5a74fd99d031edb6fcf5917.

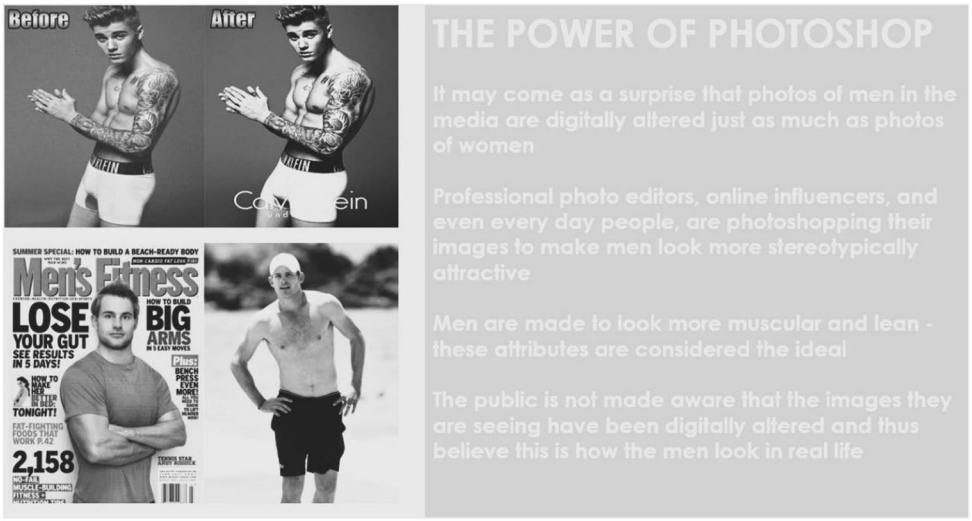

Fig. 1 Example of media literacy materials

Fig. 2 Example of cognitive restructuring materials

Measures

Participants were asked to indicate how much they used Instagram by responding to the item "I use Instagram…." with the options "never/seldom/occasionally/a fair bit/a lot".

To measure body perceptions, Cash et al. (2002) state body image scale (example item: "right now I feel extremely/mostly/moderately/slightly dissatisfied, neither satisfied nor dissatisfied, slightly/moderately/mostly/extremely satisfied with my physical appearance") was used. This scale assesses individuals' *current* state of body image and is designed to capture individuals' perceptions related to their body image in a specific moment or situation. Rather than being a stable measure, it can capture fluctuations in body image; hence its suitability for looking before and after our intervention ($\alpha = 0.86$). Participants responses were numbered from 1 to 9 with a higher score indicating greater satisfaction.

Participants were also asked "to what extent do you think the images you see on your Instagram feed are realistic?", given on a 4-point Likert scale with a higher score indicating greater realism.

Procedure

Intervention materials

To create our intervention materials, three all-male focus groups were formed. Participants were all members of the same UK university as the main studies' samples, and were recruited via social media posts. Each group contained 6 people ($M = 20.67$. $SD = 1.12$ for all 18 individuals).

Focus groups were fully informed about the nature and aims of the studies to be conducted. Each group was then asked to design six slides that encompassed the ideas of "media literacy" and "cognitive restricting" as they pertain to our research. It was explained that for the former, the materials should demonstrate how images could be manipulated in social media, showing before and after versions of

photos and how blemishes can be removed, and so forth. This content also reminded participants that images may not be representative of the typical person and that users tended only to post their best photos – see Fig. 1 for an example.

For the latter, materials should focus more on the comparisons, cognitions, and attributions Instagram users may make when viewing images – see Fig. 2. It was explained to the focus groups that those comparisons may be inadvertent and automatic, and so materials should alert users to their presence.

For both aspects of the intervention, materials were geared only towards men, concentrating on muscularity and leanness, as well as thinness. Groups were asked to use PowerPoint and were given full access to the Internet to images or other resources.

Upon completion, the researcher monitoring the session examined the draft materials and gave feedback to improvement them as needed (i.e. if a central concept had been misunderstood, or if the text did not read appropriately) and the group continued to work on them. The groups then submitted the slides to the researcher.

Following this, the researcher examined the slides a second time to check for any typographical errors or substantial issues (e.g. the use of explicit imagery) but otherwise made no changes.

The slides were then transplanted into an online survey, and sent to 10 male judges (M = 21.44, SD = 0.27) also from the same university campus. These judges rated each slide for how persuasive they found it, and how easy they found it to understand (from 1 to 5, with a higher score indicating a more positive response). Judges could also provide any open-text comments they wished about the materials; however no substantial comments were left and so this information was not used subsequently.

The ratings and comments from these judges were then examined, and the top-10 rated slides were used for the studies. No individuals involved in material development had any subsequent involvement in the project as a study participant.

Experimental procedure

Participants signed up for the experiment via Prolific. The opening page reminded participants that the study was only open to males who were over 18 years old, and active users of Instagram. Participants indicated their understanding of this and gave their consent to participate and then proceeded onto the main part of the study.

Participants first indicated how often they used Instagram, and what kind of accounts they followed (e.g. fashion, technology etc.). We then primed participants' thoughts of their Instagram feed, and the images of body types within it, to make them more susceptible to making comparisons. To do this, we asked participants to think about their Instagram feed and how they may compare to people in it. Participants were told to think about the men in their Instagram feed who were celebrities or notable individuals, not friends. They were asked to write down three such men who they admired or had positive feelings for and to indicate to what extent they compared themselves to these men, and how realistic the images of these men on their feed were. Participants then answered our main body image measure for the first time. The order of the measures and the items within the measures was randomised for each participant.

Following this, participants were presented with our intervention materials. Each slide was contained on a separate page. The materials were displayed for five seconds, then a test probe multiple-choice question about the materials appeared underneath. Participants had to answer this correctly to move to the next page.

When all ten pages were displayed, participants were told they would be asked the same questions again. It was emphasised that this was not a memory test of their previous responses, and they should answer how they felt "in the moment". Our realism and body image measures were then presented a second time, again randomised.

Once complete, participants moved onto the debriefing page where they were thanked, given further information about the study, and referred to the researcher if they had any further questions. Participants were then paid using the Prolific portal.

Statistical analysis

The data from this study was analysed first using a within-subjects ANOVA. This looked for differences in participants' state body image before and after exposure to the materials. Frequency of participants' Instagram use was included as co-variate.

Following this, a mediation analysis took place. This used the SPSS macro "MEMORE" (Montoya & Hayes, 2017) was used. This looks for mediation effects in *within-subjects* data (see PROCESS, Hayes, 2017 for the between-subjects equivalent). The measures of both the main dependent variable and mediator taken before and after exposure to the intervention materials are entered into the model. MEMORE then uses 5000 bias-corrected bootstrapped samples of the data to calculate whether an indirect effect (i.e. mediation) occurs. That is, it examines whether the change in perceived realism is the casual mechanism for the change state body image. A 95 per cent confidence interval is produced by the analysis, and mediation is said to occur if zero is not contained within this interval.

Results

T-tests between the intervention and control group examining age and frequency of Instagram use were non-significant (t (299) = 860, $p = .390$; t(299)=-0.22, $p = .82$); thus we can be reasonably assured the groups are equivalent for further analyses.

Main effects of the intervention on body perception

A within-subjects ANOVA suggested that participants stage body image was improved after exposure (M = 5.01, SD = 1.33) to the treatment compared with before (M = 4.87, SD = 1.36; F (1, 190) = 4.62, $p = .04$, partial eta square = 0.024, power = 0.99), supporting H1. Frequency of Instagram use was not a significant covariate (F (1,190) = 0.70, $p = .40$) and did not moderate the main effect (F (1, 190) = 1.21, $p = .27$).

Mediation of effects by perceived realism

Participants' perceived realism of the images in their Instagram feed was added as the mediator, with state body image scores before and after as the predictor. This demonstrated a significant indirect effect of perceived realism (B=-0.071, SE = 0.035, CI95%[=-0.144, − 0.008]). Closer examination indicated that as perceived realism decreased, participants' state body image scores increased; that is, they perceived their bodies more positively, supporting H2. Thus, there was support for the improvement of body image being mediated by the realisation that the images in participants' Instagram feed were not realistic.

Discussion

Study 1 showed good initial support for our hypotheses. Participants showed a more positive body image after viewing our treatment materials. Moreover, this change seemed to be at least partially mediated by the reduction of the perceived realism of images in participants' Instagram feeds. That is, as participants realised the veracity of those images was questionable, they felt more positive about themselves.

Rationale for study 2

In study 2, we aimed to replicate and extend these ideas. First, we were concerned that the within-subjects nature of study 1 may have meant participants guessed our hypotheses, being asked about their bodies twice following the viewing of body positivity materials. It was also not possible to do full moderated mediation analyses with our data. Thus, study 2 used a between-subjects design.

Second, we were concerned that in study 1, we had no way of regulating what participants saw in their Instagram feed. The expectation was that there would be images they would compare themselves against, but this was not a given. In study 2, participants viewed the same set of images – purportedly from Instagram – and did not use their own feed. Therefore, all participants saw the same set of images.

Third, we wanted to expand the scope of our body image measures. In study 2, we used the same state body image scale, but also included a body *dissatisfaction* scale, score using a different response method, to see if this was also influenced by our intervention. We also used an improved image realism scale for the images participants saw.

Finally, we wanted to examine whether any individual differences might moderate the effect of our intervention.

Narcissism is associated with self-aggrandizement, self-enhancement, and the promotion of a positive self-image (Clarke et al., 2015). Moreover, narcissism is often divided into two types: a more adaptive version which espouses self-enhancement and superiority known as *grandiose* narcissism, and a more vulnerable or hyper-sensitive version associated with inadequacy and incompetence known as *vulnerable* narcissism (Miller et al., 2011). Unsurprisingly, narcissism has been implicated in social media use. For example, those high in narcissism use social media more overall (Davenport et al., 2014) and post more "selfies" on their pages (Moon et al., 2016). Narcissists' motives for using social media to lean more towards self-enhancing motives, such as looking "cool" (Sheldon & Bryant, 2016). Perhaps more concerningly, narcissism also seems to increase the risk of an individual's demonstrated addiction to social media (Balcerowska et al., 2019; Brailovskaia, Bierhoff et al., 2020).

Research suggests that narcissism may improve individuals' body image. Davis et al. (1997) reported that participants with high levels of adaptive narcissism showed enhanced body esteem relative to those with low. Similarly, higher levels of more adaptive (or in this study, "grandiose") narcissism have been found to relate to lower body shame, and a more positive self-image amongst participants (Carrotte & Anderson, 2019). Both of these studies used only female participants; however, Jackson et al. (1992) reported a positive relationship between individuals' level of narcissism and their body esteem for both male and female participants but did not make a distinction between types of narcissism. By contrast, Swami et al. (2015) found no significant relationship between narcissism except for participants who demonstrated it at a clinical level; where those individuals showed a more negative body image.

If (adaptive) narcissism can enhance body image, perhaps this, in turn, may protect participants against the deleterious effects of social media. That is, because those individuals are already predisposed to have a more positive body image, they are less prone to negative social comparison when exposed to thin- or muscular-ideal images on Instagram. To examine this issue, in study 2 we include a measure of adaptive narcissism as a moderator of our intervention's effectiveness.

In study 2 then, male participants were asked to view images of male models purportedly from Instagram, and then to respond to scales regarding their body esteem. In the intervention condition, participants viewed our intervention materials first, then model images, and then responded to our measures. In the control condition, participants viewed the model images first, then responded to our measures, and then viewed our intervention materials. This was to fulfil our ethical obligations and ensure that all participants had access to the intervention materials at some stage.

Our hypotheses for study 2 remain largely the same; namely: that participants' body image will be more positive when they have viewed our intervention materials, for state body image (H1a) and body dissatisfaction (H1b). This effect will be mediated, at least partially, by participants' perception of the realism of the images they have seen (H2). Finally, we expect that narcissism will render intervention materials less effective as those participants' body images will not be damaged by exposure to model images, and thus will not need restoring (H3).

Study 2

Method

Participants

A power analysis in G-Power using a medium effect size ($f = 0.025$), $\alpha = 0.05$, for 80% power with one covariate showed that 128 participants were required for this study. Three hundred and fifty participants signed up to take part in this study. Participants were recruited from the crowdsourcing website Prolific, in return for a small monetary fee (around £0.80p). After data collection had ended, participants who had not responded to at least 95 per cent of items, had failed attention checks, had indicated they were under 18, or had indicated they were female were removed from the sample, leaving 301 participants. The age range of the included participants was from 18 to 73 years, with a mean age of 27.47 years ($SD = 9.26$ years).

Design

A between-subjects experimental design was used. Participants were randomly allocated to the intervention or control groups. In the former, participants viewed our intervention materials before viewing the stimulus images or responding to body image scales. In the latter, they viewed the materials *after* completing all scales and measures in order to ensure that all participants got a chance to see them and fulfil our ethical obligations.

Materials

The same state body image scale used in study 1 was used again here. In addition, a state body dissatisfaction measure was included (Heinberg & Thompson, 1995). Here, participants responded to the items "how dissatisfied are you with your weight right now?" and "how dissatisfied are you with your appearance right now" on a scale from 0 (not at all) to 100 (very much so). Responses to the two items were averaged to create a single score ($\alpha = 0.77$).

To measure narcissism, the Narcissism Personality Inventory 16-item version (NPI-16) was used (Ames et al., 2006). Participants gave a response to statements (e.g. "I really like being the centre of attention") on a scale from 1 (strongly disagree) to 7 (strongly agree; $\alpha = 0.83$). This scale has been used in this fashion previously to measure grandiose narcissism (see Gu et al., 2021; O'Reilly & Pfeffer, 2021).

To measure perceived realism of the images, the four-item realism scale from Tiggemann et al. (2013) was used, adapted to be about men instead of women (example item: "the men in the images present a realistic goal for the average man"; $\alpha = 0.81$).

Frequency of using Instagram was measured by asking participants "how often do you use Instagram?" with responses ranging from 1 = Rarely to 4 = Very often ($M = 2.35$, $SD = 1.12$).

For the male model images, a selection of images was chosen by the researcher as possible stimuli. These were taken from online fashion websites and Instagram feeds. Criteria for inclusion were that the models: (1) had a well-defined, mesomorphic physique, (2) were showing off their bodies (i.e. were topless), and (3) were not famous "named" models. Models from different ethnicities were also chosen.

Around 20 images made up the initial batch of stimuli. These were then shown to 10 judges who rated each model on their attractiveness and how desirable their bodies were for a man to have. The four highest-rated were then used as stimuli. Initially, those images were only white-ethnicity models, so two of those images were removed and two other high scoring images of black-ethnicity and Asian-ethnicity were included instead.

Procedure

Participants were told that the study was regarding "perceptions of Instagram models" and that they would be "asked some questions about models, and themselves". The true purpose of the study was deliberately obscured to avoid biasing responses. Initially, participants were presented with an online consent form where they indicated they understood their right to withdraw and entered their code required for payment via Prolific. They also entered their demographic details, after which the experiment began.

Participants in the intervention condition were then shown the intervention materials. An introduction told participants that the researchers were interested in how Instagram models were viewed by users of the app (again to obscure the true purpose). Participants then self-paced through the slides. To progress from one to the next, participants were required to answer a question about the material to ensure engagement.

After this, participants were told that they would view some images from fashion and fitness Instagram feeds. Participants were asked to view each image, and rate how attractive they perceived them to be, and how much they would like to look like them. This was to engage social comparison processes in the participants. Participants were shown the four stimulus images in turn and could not move on from an image until at least five seconds elapsed; after which the "next" button appeared.

After they had viewed the images, participants were presented with our four scales: state body image, state body dissatisfaction, narcissism, and the perceived realism of the images. The order of scale presentation was randomised for each participant, and the order of items in each scale was also randomised. However, participants saw all items on the same scale before progressing to the next.

Upon completion, participants were given a final option to withdraw their data. Once they had decided, they moved to the final page of the experiment which gave a debrief regarding the study's true purpose. Participants were also invited to contact the researchers if they had any further questions (none did).

In the control condition the same sequence of events occurred, except participants viewed the intervention materials at the *end* of the experiment, *after* viewing the stimulus images and giving their scale responses, and prior to the debrief. Thus, these participants' responses were not influenced by the materials. This was an ethical consideration to ensure all participants had access to the intervention materials regardless of condition.

Statistical analysis

A between-subjects MANCOVA was performed using condition (treatment before images vs. after images) as the independent variable, and body image and body dissatisfaction as the dependent variables. The frequency of using Instagram was included as a covariate as some work has showed greater exposure to Instagram may facilitate social comparison (Engeln et al., 2020).

Following this, the SPSS macro PROCESS was used (Hayes, 2017) to examine mediation and moderation. This software produces 5000 bias-corrected boot-strapped samples and produces a confidence interval for effects. An effect is said to be statistically significant if the confidence interval does not contain zero.

Results

For state body image, the MANCOVA produced a significant main effect of condition ($F(1, 295) = 7.67$, $p = .006$, partial eta squared = 0.03, power = 0.86) indicating that participants were more positive about their bodies when they had seen the treatment materials prior to exposure to the modelling photos ($M = 5.23$, $SD = 1.06$) compared with when they had not ($M = 4.81$, $SD = 1.64$), supporting H1a. Frequency of Instagram use was not a significant covariate ($F(1, 295) = 0.65$, $p = .42$, partial eta squared = 0.002).

For body dissatisfaction, the same effect was found ($F(1, 295) = 6.87$, $p = .009$, partial eta squared = 0.03, power = 0.86), supporting H1b. Body dissatisfaction was lower if participants were shown the treatment prior to viewing models' images ($M = 40.37$, $SD = 23.51$) compared with not ($M = 48.12$, $SD = 27.86$). The frequency of Instagram use was again not a significant covariate ($F(1, 295) = 2.81$, $p = .15$, partial eta squared = 0.007).

A moderated mediation model was the constructed with state body image as the outcome variable. The condition was entered as the predictor, realism of the viewed images was the mediator, and narcissism was the moderator. A product term was constructed for each pathway in the mediation diagram (model 59). Instagram use was included as a covariate.

The output of this analysis suggested that narcissism did not moderate the effect of the treatment on perceived realism ($B = 0.079$, $SE = 0.113$, $t = 0.70$, $p = .49$, CI95%[-0.144, 0.032] nor the effect of perceived realism on state body image ($B = -0.147$, $SE = 0.075$, $t = -1.95$, $p = .052$, CI95%[-0.249, 0.0013]. A moderation on the direct effect between condition and body image was present, however ($B = -0.15$, $SE = 0.14$, $t = -2.46$, $p = .01$, CI95%[-0.602, −0.067]. Examination of the Johson-Neyman region showed that for participants with high narcissism (over 4.89 on the scale), body

image ratings between treatment and control conditions were not significantly different. Using this value, participants were split in to high and low narcissism groups, and an ANOVA was performed using this grouping and condition as IVs. This showed an overall main effect of narcissism (F (1, 297) = 21.91, $p < .001$) but no interaction (F (1, 297) = 1.57, $p = .21$). Those with high narcissism tended overall to show more positive body image (M = 5.29, SD = 1.34) compared with those with low narcissism (M = 4.58, SD = 1.38). That is, our treatment did not affect those with high narcissism because their body positivity was already very high. Thus, H3 received partial support. The frequency of Instagram use was not a significant covariate within the model (highest values: B = 0.0094, SE = 0.046, t=-0.20, $p = .84$).

Because narcissism did not impact indirect effects, a second simple mediation analysis was performed (model 4) with it removed. This showed a significant indirect effect of realism on state body image (B = 0.311, SE = 0.105, CI95%[0.108, 0.524]), showing support for H2. Participants who viewed the treatment prior to the models' images showed a reduced belief that the models were realistic, which in turn led to a more positive body image.

The same analyses protocol was then performed for the body dissatisfaction measure, with similar results. Again, narcissism did not moderate the effect of treatment on perceived realism (B = 0.073, SE = 0.114, t = 0.64, $p = .52$, CI95%[-0.151, 0.298) nor the effect of perceived realism on body dissatisfaction (B = 1.14, SE = 1.62, t = 0.71, $p = .48$, CI95%[-2.05, 4.33]. Narcissism also did not moderate the direct effect of treatment condition on body dissatisfaction (B = 5.18, SE = 2.93 m t = 1.77, $p = .08$, CI95%[-0.594, 10.96], meaning there was no further support for H3. The frequency of Instagram use was a significant covariate in the model (B = 2.63, SE = 1.17, t = 2.24, $p = .03$, CI95%[0.321, 4.95]) indicating that as the frequency of use increased, so did body dissatisfaction.

A second mediation analysis with narcissism absent was performed, which gave further support to H2; the idea that the decrease in body dissatisfaction because of exposure to our treatment was caused by a reduction in perceived realism of the stimulus images (B=-4.62, SE = 1.57, CI95%[-7.85, -1.66]. Participants who viewed the treatment before seeing images showed a decrease in the belief that they were realistic, which in turn led to a decrease in body dissatisfaction.

Finally, as it had been found to be a significant covariate, participants' frequency of Instagram use was included as a moderator for all pathways in the mediation model. Again, this produced no significant moderation (highest values: B = 1.86, SE = 2.39, t = 0.78, $p = .44$, CI95%[-2.84, 6.55]) indicating that participants' frequency of Instagram use did not impact the effectiveness of our treatment.

General discussion

The aim of this paper was to examine the effectiveness of a prototype intervention for men's body issues relating to social media use, specifically Instagram. Although research on women's body dissatisfaction following exposure to social media is plentiful (Baker et al., 2019; Lup et al., 2015), there is a dearth of literature from a male perspective (Jankowski et al., 2017; see also Jarry and Ip, 2005). Moreover, a separate examination of male issues is essential given that the body focus tends to be on different aspects compared to females (Gonzales & Blashill, 2021; Gültzow et al., 2020; Hobza et al., 2007).

Across the two studies, we found support for the effectiveness of our intervention. In study 1, exposure to materials that espoused media literacy regarding the veracity of images on Instagram, and cognitive restructuring which aimed to highlight the potentially harmful inferences participants were making regarding their bodies, led to a more positive body image (H1). Moreover, this seemed linked with perceptions of perceived realism of the images in their Instagram feed– after viewing our materials, participants rated the images as less realistic than before, and this mediated the effect between exposure and improve body image (H2).

Corresponding effects were found in study 2 where participants viewed a specific set of images, rather than their own social media feed. Here, participants who had seen our materials prior to viewing images of idealised bodies had a more positive body image (H1a) and lower body dissatisfaction (H1b) than those who had not. This effect again was mediated by perceived realism (H2); participants who viewed our materials perceived the subsequent idealised images as *less* realistic, and this in turn improved perceptions of their own bodies.

In addition, narcissism seemed to moderate the effectiveness of the intervention material, supporting H3. That is, high levels of narcissism seemed to render the intervention ineffective. However, a closer examination showed that this was because those with higher levels of narcissism did not suffer from body dissatisfaction to the same extent as those with lower narcissism. Therefore, there we no deleterious effects for our intervention to attenuate. This is in line with previous research that has demonstrated high narcissism may offer protection against body image issues (e.g. Carrotte and Anderson, 2019; Davis et al., 1997; Jackson et al., 1992), and other potentially damaging influences generally, such as negative life events (Zuckerman & O'Loughlin, 2009). This does not mean that high narcissism should be considered universally beneficial. For example, Long et al. (2021) showed that high levels of narcissism can correspond to increased levels of "fear of missing out" (FOMO)

when using smartphones, eventually leading to problematic usage. Nevertheless, this finding does lend further support to the notion of grandiose narcissism as a possible adaptive trait.

Some other important findings also came to light. First, the extent of Instagram use did not seem to moderate these effects. Previous work has shown that the frequency of Instagram use seems to correlate with lower body dissatisfaction (Couture Bue, 2020; Engeln et al., 2020; Sherlock & Wagstaff, 2018; Trifiro & Prena, 2021) suggesting a priori that greater use may mean an intervention was less effective as it has a greater detriment to overcome. However, that did not seem to be the case. Moreover, this seems to be duplicated in other studies. Weinstein's (2017) intervention study on women found no effect of Instagram use on effectiveness, and Weber et al.'s (2004) intervention was just as effective when controlling for Instagram use. Although counter-intuitive, this finding offers a great benefit when creating social media intervention, as it suggests materials do not need to be tailored to the participants' usage, but rather a "one-size-fits-all" solution can be implemented.

Limitations of the current work

Although valuable, there are also a number of issues with the findings from the current work. First, the long-term effectiveness of the intervention materials needs to be evaluated. Participants have displayed improve body perceptions following exposure to our materials, but it remains to be seen whether this continues after they have finished the experimental session. Research suggests that the effects of CBT interventions can continue to be effective even once treatment ends (Hofmann & Smits, 2008; Hollon et al., 2006), but of course these are much more intense than the interventions used in the current work. Whether these materials can work long term is currently under investigation by the authors. We have also not directly asked participants their opinion of the materials and to what extent they read and processed the content they contained. Again, this is something that will be incorporated into future work.

Second, we have not accounted for any specific body image issues participants may already have, such as appearance comparison orientation (ACO). ACO is a psychological construct that refers to the tendency of individuals to engage in frequent and salient comparisons of their own physical appearance with others. A higher ACO is associated with negative body image, body dissatisfaction, and lower self-esteem generally (Fardouly et al., 2015). Moreover, Perloff et al. (2017) showed that frequent appearance comparisons on social media platforms were related to higher levels of body dissatisfaction and a greater desire to engage in appearance-altering behaviors. In the current work, we have treated all participants as homogeneous (with the exception of narcissism in study 2) which may be somewhat inaccurate.

Finally, we have used survey measures in this study, which can be influenced by social desirability or internal bias (Thompson & Cafri, 2007). It would be advisable in future work to also include some more diverse measures such as body distortion tasks (Feusner et al., 2010), or implicit association tests (Cardi et al., 2013) to tap into body image issues more comprehensively.

Other individual difference variables

As narcissism appears to be an important personality trait when considering intervention effectiveness, moving forward we may like to examine other individual differences which may also be influential.

An individual's mindset may impact the effectiveness of interventions. A fixed mindset refers to the tendency to see personal traits as immutable and unable to change through effort, in contrast to a growth mindset which believes such traits are malleable and can be altered (Dweck & Leggett, 1988; Molden & Dweck, 2006; Mullarkey & Schleider, 2020). Previous work has shown that a fixed mindset can lead to more critical social comparison when using Instagram (Lee-Won et al., 2020), which in turn may make an intervention less effective.

Neuroticism has been implicated as an important individual difference when looking at social media use, with research suggesting those high in this trait use such sites excessively, and are more reliant on them (Balta et al., 2020; see also Bowden-Green et al., 2021, for a meta-analysis). Some work has suggested that high neuroticism makes intervention less effective (Potgieter & Venter, 1995); however, other research has shown neuroticism can increase vigilance to potentially damaging influences, improving intervention effectiveness (Friedman, 2000; Weston & Jackson, 2018). Furthermore, neuroticism combined with high levels of conscientiousness also seems to promote a strong adherence to healthy behaviour change (Stieger et al., 2020).

An individual's social comparison orientation (SCO) refers to the extent to which they tend to compare themselves with others (Gibbons & Buunk, 1999). A number of studies have shown that a higher SCO leads to maladaptive social media use. For example, Wang et al. (2017) demonstrated that a stronger SCO increased the upward comparisons a user made against those in their social media stream, decreasing self-esteem. Similarly, Yang (2016) reported that those with a greater SCO felt more loneliness when using social media. This may suggest that SCO may be an important factor when considering body image interventions, as those with a stronger tendency to compare may be less

inclined to listen to advice. However, Wang (2019) showed that a higher SCO led to a greater likelihood of editing "selfies" on social media, suggesting that those individuals may be more aware of this process and its ubiquity on Instagram. Therefore, perhaps a higher SCO would lead to greater effectiveness of our intervention, as those individuals are already aware of how deceiving their social media feed can be.

We have examined grandiose narcissism in this paper, but a vulnerable form of narcissism also exists wherein individuals are usually hypersensitive and struggle with inadequacy (Miller et al., 2011). Research suggests that there are similarities between these two types in terms of social networking use. Both grandiose and vulnerable narcissism tends to correspond to a greater likelihood of Facebook addition (Brailovskaia, Rohmann et al., 2020), and both tend to objectify others more than those low in those traits (Lachowicz-Tabaczek et al., 2021). However, there are some differences. Vulnerable narcissism tends to correspond to a greater feeling of envy (Neufeld & Johnson, 2016) when viewing the lifestyles of others. Increased feelings of envy can lead to greater attention to, and memory for, visual stimuli (Hill et al., 2011). Therefore, vulnerable narcissism could lead (via envy) to more pervasive effects of social comparison when viewing Instagram images, making an intervention less effective.

Future directions

We have established initials support for our web-based intervention, targeted at men, and shown how tailored solutions may be important when considering body image. Going forward, several other aspects need examining.

We have combined elements of media literacy and cognitive restructuring in our intervention materials, but currently have no indication of the individual contribution each one makes to any psychological change. Media literacy training encourages critical thinking and analysis (Kurz et al., 2021). Typically, this leads to more scepticism of materials viewed in the media (Rodgers et al., 2019), and awareness that there is often a motive for individuals to post certain things that show them in the best light (McLean et al., 2016). Since we found support for the perceived realism of Instagram images as a significant mediator, this points towards the contribution of the media literacy component of our intervention.

By contrast, cognitive restructuring works more towards an analysis of one's own thoughts, identifying and correcting those that may be deleterious (Chrétien et al., 2017). The way an individual processes information, and the thoughts they generate, are addressed (Jarry & Ip, 2005). For example, patients are taught new ways of appraising their cognitions (Klimek et al., 2020), or how to become more comfortable with stimuli they find aversive; a reduction in experiential avoidance (Fang et al., 2020; Niles et al., 2014). The current study lacks a method of showing the mechanism between exposure to our intervention and improvement of body image. Future studies should examine these aspects in more detail to get a fuller picture of how cognitive restructuring operates in this protocol.

This study has not examined the role of sexuality in any effects. However, research suggests that the LGBTQ + community comprises a huge part of the social media landscape (Seidenberg et al., 2017). Moreover, the risk for eating disorders amongst gay, bisexual, and other men who have sex with men (GBMSM) is close to those experienced by women (Conner et al., 2004; Morrison et al., 2004). There is a lack of literature examining this issue in detail, particularly regarding interventions that may be more explicitly tailored towards non-heterosexual individuals (Filice et al., 2020). Therefore, we may like to further develop intervention materials to help this vulnerable group.

The ethnic makeup of our sample is also something important to consider, as different ethnic groups may place different emphasis on idealised body characteristics. For example, Black males may place greater emphasis on the muscularity of their bodies (Ricciardelli et al., 2007) compared with White males, and Asian-Americans may place less (Keum et al., 2015). This in term may change how influential the exemplars they encounter on social media are. The ethnicity of the user should therefore be incorporated when considering an intervention's effectiveness, and nuanced adjustments may be needed to the materials in order to maximise their relevance.

Conclusion

In conclusion, this paper is one of the few that has examined the effectiveness of an intervention in men's body image issues relating to Instagram use. Across two studies, we have shown that an online slideshow containing media literacy and cognitive restructuring material can improve body image (study 1) and reduce the negative effects of viewing desirable Instagram images (study 2). Moreover, this is independent of participants' frequency of Instagram use, although the effect does seem diluted by participants' narcissism.

In future work, we will examine how persistent these effects are, through a longitudinal study. We also aim to look at further individual differences variables, and how the individual aspects of media literacy and cognitive restructuring contribute to effects. Finally, we intend to see how generalisation our intervention may be to non-heterosexual

individuals, to further increase the safety of others when using social media.

CRediT roles CS: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Resources; Roles/Writing - original draft; Writing - review & editing. MC: Roles/Writing - original draft; Writing - review & editing.

Data availability The materials used in this study, and the data analysed can be found at the anonymised Open Science Framework project page: https://osf.io/6euwp/?view_only=c48bc342d5a74fd99d031edb6fcf5917.

Declarations

Ethics statement The experimental protocols used in both studies was passed by the institution's ethical review board, and adhered to the British Psychological Society's ethical standards. All participants gave their informed consent prior to participating.

Ethical approval The studies in the manuscript obtained ethical approval from the institution's review board, and adhered to the British Psychological Society's code of ethics.

Informed consent Information consent was obtained from all participants.

Competing interest The authors have no competing interests, either financial or non-financial, to disclose relating to this manuscript.

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