

## Research

# Social comparison on Instagram, and its relationship with self-esteem and body-esteem

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## Abstract

**Background** Previous research has shown that online social comparison can affect perceptions of self-esteem and body image.

**Purpose of the study** This study focussed on social comparison on Instagram and its relationship with levels of self-esteem and body-esteem.

**Materials and methods** Levels of self-esteem and body-esteem were measured using self-report questionnaires, before and after viewing Instagram images eliciting upward, downward, or no comparison.

**Results** Statistical analysis showed self-esteem and body-esteem scores significantly increased after downward comparison, with no change in scores following a neutral condition. Body-esteem scores significantly decreased after upward comparison, whilst self-esteem scores did not. Support for social comparison theory is provided.

**Conclusions** Future research and implications are discussed, such as educating young people about posting and viewing of overly positive images on social media. Social media organisations could provide access to resources which provide advice about mental health issues and support for individuals wanting to discuss body image issues. Future research could potentially establish if participants' views about eating change after engaging in differing levels of social comparison on Instagram.

**Keywords** Social comparison · Instagram · Self-esteem · Body-esteem · Eating disorder · Social media

## 1 Introduction

The use of social media has rapidly increased in recent years, with 71% of young adults reporting using Instagram [1], and internet users globally spending an average of 151 min on social media daily in 2022 [2]. Social media use increased during the COVID-19 pandemic, with users seeking increased social support throughout lockdowns and social distancing [3], and the number of females following appearance-focused accounts on Instagram significantly increasing [4], resulting in social networking sites such as Instagram becoming indispensable to many people [5]. Social media has many benefits, including enhancing communication and social connection [6] and access to information [7]. However, it has also been associated with negative outcomes, including increased loneliness and social isolation [8], crucially in adolescents [9].

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Hooper et al. [10] reported increased levels of anxiety, depression, and body dissatisfaction among adolescents who were frequent users of social media. Passive social media use has also been shown to negatively affect wellbeing [11], potentially due to individuals using sites such as Instagram to share only socially desirable information about themselves, allowing them to present a better, more controlled self-esteem image to others online [12], known as positive self-esteem presentation [13]. By sharing only positive information online, the user's reality is often not reflected [14]. For example, it has been noted how, to conform with existing beauty norms, many photos uploaded to social media are edited, with women editing photos more frequently than men [15]. Social media sites also facilitate selective self-esteem presentation through allowing users to edit or delete unfavourable posts or be untagged from unflattering photos or videos [16]. Research has shown that [17] browsing social media sites containing false representations of user's lives can trigger the occurrence of social comparison.

## 1.1 Self-esteem and body-esteem

Self-esteem is defined as an individual's subjective opinion about themselves, including self-worth, their perception of their place in the world, and their abilities such as perceptions of mastery and confidence [18]. The self-esteem scale was developed by Rosenberg [19] who defined self-esteem as an individual's evaluation of their worth and value as a person and it can be viewed as a trait or a state. Where self-esteem is considered as a trait in research, it refers to a stable characteristic of an individual's evaluation of themselves and a relatively enduring aspect of an individual's personality; although it tends to be more fluid during adolescence [20]. Individuals who report high trait self-esteem usually have generally positive beliefs about themselves and tend to have better overall psychological functioning, e.g. they are more resilient to stress. Whereas individuals reporting low self-esteem often have negative views of themselves and are more vulnerable to mental health problems such as depression or anxiety. When self-esteem is considered as a state by researchers, it refers to an individual's current level of self-worth and can naturally change depending on the situation, mood or social context; so it could be high in one situation, but low in another. As it is fluid, it is possible to improve state self-esteem through targeted interventions or changing contextual factors [21]. Changes in state self-esteem are a normal and adaptive part of an individual's experience and enhancements in state self-esteem can be a positive and motivating experience. However, when state self-esteem reduces (as a result of a situation or context), it can be a risk factor for mental health problems. Both trait and state self-esteem are important aspects of psychological functioning, and they can have significant implications for mental health and well-being. In summary, self-esteem is a multidimensional construct which varies in terms of its level, stability, and context dependency. A measure of state self-esteem that has been validated and will be used in this study is the State Self-esteem Scale [22].

Body esteem refers explicitly to an individual's feelings and attitudes towards their physical appearance, including weight and shape, body image and perceptions of physical attractiveness [23]. Body esteem is a component of self-esteem. The Body Esteem Scale for Adolescents and Adults (BESAA) was initially developed in 1997 [24] and a later revision [22] differentiated an individual's feelings regarding their own weight, from feelings about their own general appearance, and how they view themselves compared to others. This revision resulted in three subscales: appearance (general feelings about appearance), weight (satisfaction with body weight) and attribution (evaluations attributed to others about one's own body and appearance). The BESAA has high reliability, validity and internal consistency, illustrating that the items within each sub-scale measure the same construct. Recent studies have validated the BESAA in various cultural contexts and have confirmed its applicability across diverse populations demonstrating high internal consistency and strong test-retest reliability [20]. For example, in a cross-sectional study, researchers [25] completed a psychometric validation of the BESAA with a Spanish adolescent sample. They conducted an exploratory and confirmatory factor analyses to produce a reduced 14-item Spanish version (BESAA-S), which retained the original three-factor structure (BE-Weight, BE-Appearance, and BE-Attribution) of the BESAA. They reported test-retest reliability which showed that all factors achieved strong ratings and discriminant validity between the subscales was supported. Similarly, Garbett et al. [26] translated the BESAA to assess the body esteem of Indonesian adolescents. Using an experimental research design the translated scale was found to be a valid measure, demonstrating good internal consistency and test-retest reliability. A culturally significant finding in the study was that the risky adolescent behaviours were shown, including the use of skin whitening products in attempts to alter appearance.

Most studies relating social media to body and self-esteem have focussed on female samples. A study by Menon et al. [27] found gender differences across self-esteem evaluations, whereby females reported lower levels of self-esteem and were more likely to make unfavourable upward social comparisons, compared to males. Interestingly, this result was found cross all 48 ethnicities in the study. Celebrity endorsements and influencer culture contribute to an idealised

standard of beauty against which adolescents can measure their self-worth. Pedalino and Camerini [28] found that young females, when browsing Instagram, often found themselves involuntarily comparing themselves to celebrities, social media influencers and peers. Similarly, researchers have [29] examined the effect of celebrity images, compared with equally attractive peer and control images, on women's body image. They found increased body dissatisfaction following exposure to attractive celebrity and peer images compared to control images, mediated by social comparison, indicating that exposure to attractive celebrities and peers can have an immediate negative effect on women's mood and body image.

## 1.2 Social comparison

Social comparison is defined [30] as the innate drive individuals have to set their own personal worth, and form their opinions and beliefs about themselves, according to how they view themselves in comparison to others, through evaluating their similarities and differences. Individuals frequently use social comparison to evaluate and enhance their self-esteem [31].

Social comparison can occur through both upward and downward comparison [30]. Upward comparison occurs when an individual compares themselves to someone perceived as superior to themselves, this could be in terms of success, appearance and/or likeability, which then leads to the individual desiring to become more like them [5]. Examples of online upward social comparison include individuals posting about their well-behaved children or considerate partner, or uploading photos of delicious-looking food, which others online may not possess [5]. A meta-analysis [32] explore the way that viewing such content on social media can cause feelings of inferiority, envy and frustration. Upward comparison can cause individuals to believe they do not live as good or happy a life as others, often resulting in a sense of loss or negativity [5]. Research [33] has found that those who used Facebook more frequently thought others were happier and had better lives than their own, due to the occurrence of positive presentation of others online. Offline upward social comparison has been found to be associated with an increased likelihood in developing disordered eating thoughts and behaviours for both adults [34] and adolescents [35], indicating the consequences of engaging in upward comparison online could be severely detrimental to users. Hooper et al. [10] found that in an RCT of 162 young female participants, exposure to thinspiration and fitspiration images on social media significantly decreased levels of self-esteem, body appreciation, and positive mood, while at the same time they increased negative mood. Other research [36] which identified body dissatisfaction as the strongest predictor for the symptoms and behaviours of eating disorders, suggesting exposure to these images online could have an extremely detrimental impact on the mental health and eating behaviours of social media users.

The perception of upward social comparison is intensified by the social media positivity bias, which is a tendency for individuals to selectively present overly positive self-content online, rather than accurate portrayals of the self [37]. R  ther et al. [38] found that individuals who were frequent content consumers of digital media viewed others as happier, healthier and more successful than themselves; consequently, they were more likely to engage in upward social comparisons in a digital context. The authors also found that adolescents who were exposed more to upward social comparisons experienced intensified feelings of inadequacy, and in some cases, this could lead to a social pressure to conform to unattainable or unrealistic beauty standards. There are few studies that investigate how long the impacts of online social comparison last, although one study did show that the impacts are not always long-lasting. Hooper et al. [10] conducted a random control trial (RCT) to investigate whether a mindfulness meditation could ameliorate the effects of exposure to idealised social media images on self-esteem, mood, and body appreciation. They revealed that a 10-min mindfulness meditation intervention significantly reduced these effects (by increasing self-esteem, body appreciation scores and positive mood and reducing negative mood) compared to those in the control group.

According to previous research [39], downward comparison allows individuals to increase wellbeing through comparing themselves with someone perceived as less fortunate, often occurring when self-esteem is threatened in an attempt to restore it, which is effective because comparison with someone worse off can make an individual feel better about their own situation. A potential example of online downward comparison is a healthy individual comparing themselves to someone suffering, such as an individual posting about illness or a bad day, and the comparer subsequently feeling happier [17]. During the COVID-19 pandemic, downward comparison was frequently engaged in when a larger number of negative experiences were shared online, including disclosures of stress related to COVID-19 [3]. It has been suggested [40] that this may potentially have lessened the negative impact of online social comparisons, due to many feeling others were sharing similar difficulties, making them feel better about themselves.

The global COVID-19 pandemic necessitated a shift to online platforms for education, work, and social interactions, and the lockdown periods significantly increased screen time and exposure to digital media. The resulting reliance on digital media heightened the potential for adverse psychological effects, particularly among adolescents and young adults who used social media as a means of escape, entertainment and connection during the pandemic. Recent research has highlighted the intensification of body image issues and mental health challenges due to the prolonged exposure to idealised body images and the resulting social comparisons. The impact of the COVID-19 pandemic on the psychological and social repercussions for students has been widely discussed, for example, Hong et al. [41] explored the adverse impacts of social media exposure on psychological distress and suggested this occurred through a process of rumination. Sergi et al. [42] found that students perceived emotional self-efficacy of negative emotions and perceived scholastic self-efficacy were positively correlated with students' perceived quality of distance learning. The increase in passive browsing online during the COVID-19 pandemic is also suggested to have triggered an increased tendency for social comparison across social media sites [17].

Research investigating online image exposure and self-esteem [43], involved participants rating their self-esteem following exposure to Facebook social media profiles causing upward or downward comparison. The researchers found that exposure to images eliciting upward comparison resulted in lower self-esteem ratings compared to exposure to images eliciting downward comparison, suggesting upward comparison caused by viewing social media profiles with positive content may have detrimental effects on self-esteem. This challenges studies suggesting social media use improves self-esteem, including one [44] primarily involved participants viewing their own social media profiles, and therefore their own idealised versions of themselves instead of others, limiting the amount of social comparison participants engaged in. These researchers [43] also highlighted the risks of overexposure to upward social comparison information. They note that because social networking sites are often perceived as safe environments [45], those with low self-esteem often choose to express themselves through them to receive social support, but instead further impair their self-esteem through engaging in upward comparison, potentially resulting in a detrimental cycle of social media use.

The research presented emphasises the need to identify the relationship between social media use and their impact on esteem, and the research findings could contribute to targeted interventions to mitigate the adverse impacts of social media.

### 1.3 Rationale

Some limitations can be noted regarding the methodology of previous research, such as target images not being presented in a social media format, but as a slideshow. For example, images have been presented through a Facebook profile format [42], potentially limiting the influence the stimuli may have had, as Facebook has been shown to be used increasingly less by young adults, with newer forms of social media, such as Instagram, being relied upon more [46]. Instagram has been named as the most influential form of social media [47], and it has even been suggested that Instagram encourages social comparison [48]. Therefore, it is important to investigate the relationships between social comparison and lower self-esteem and body-esteem ratings on newer apps such as Instagram. The importance of the facilitation of communication on social media sites such as Instagram, through positive and negative comments being displayed publicly is also important [28]. The number of likes or variety of comments on a post are factors that could potentially contribute towards the process of upward or downward social comparison online. Due to participants not viewing images in the form of social media posts, or viewing accompanying likes and comments, it could be argued that the results of previous research could have been affected.

Due to this lack of research relating Instagram image exposure and self-esteem and body-esteem, and Instagram's ever-growing popularity [49], this study aimed to investigate whether similar ratings of both self-esteem and body-esteem were present when target images were exposed through a manipulated Instagram page, instead of Facebook. It was important that the current study used a social media format to present target images, and that likes and comments for posts were included. Previous research [43] only used target images portraying either upward or downward comparison, without a neutral control condition. Therefore, in our study it was important to establish whether exposure to images resulting in no comparison had a relationship with either self-esteem or body-esteem ratings, to ensure the only variable being tested was exposure to the different images. This requirement led to the inclusion of a neutral control condition in the current study, alongside upward and downward comparison conditions.

In previous research [29], control images were travel-related, some including an individual. However, for many travelling may be viewed as an unattainable luxury, potentially resulting in participants feeling inferior to individuals in

control images. It has been noted [50] how easily travel posts on social media can trigger upward comparison due to the envy they can cause, suggesting such control images may potentially have elicited upward social comparison instead of no comparison, which could have subsequently influenced reported body-esteem levels. Consequently, the current study carefully chose control images to avoid eliciting any emotional response, including images of a stone wall or grass, to remove any risk of upward or downward comparison, and therefore not jeopardise the study's results.

Finally, in two similar previous research studies [29, 43] a female-only sample was used, potentially meaning their results are not widely generalisable. To avoid this and ensure a wider variety of participants, the current study aimed to recruit both males and females, and ensured the target images used were relevant for both genders by including photos of each, as well as images showing relationships, for all comparison levels. The following two hypotheses are proposed:

H1: There will be a significant interaction between Instagram image comparison level and post-image self-esteem rating. The null hypothesis is that there will be no interaction between Instagram image comparison level and post-image self-esteem rating.

H2: There will be a significant interaction between Instagram image comparison level and post-image body-esteem rating. The null hypothesis is that there will be no interaction between Instagram image comparison level and post-image body-esteem rating.

## 2 Method

### 2.1 Design

A  $3 \times 2$  mixed factor experimental design was used. The first between-subjects independent variable was Instagram image comparison level, manipulated using three levels: upward, downward, and a neutral control condition. The second within-groups independent variable was timepoint of questionnaire data collection, with two levels: before image exposure and after image exposure. The dependent variable for H1 was reported self-esteem levels, measured with the State Self-esteem Scale [51]. For H2, the dependent variable was reported body-esteem levels, using the Body-Esteem Scale for Adolescents and Adults (BESAA) [24].

### 2.2 Participants

Fifty undergraduate Psychology students with social media accounts were recruited from one University located in the south of the United Kingdom through volunteer sampling; they were recruited opportunistically by replying to an advert on the departmental research participation website. One individual did not complete all questionnaires and was excluded from the final dataset. The sample consisted of 43 female students and six male students. Participant ranged in age from 18 to 35 years, with a mean age of 20 years ( $SD = 2.91$ ). No other demographic data was collected, therefore it is not known if this sample was representative of psychology students or students at this University. The University's psychology research participation system (SONA) was used to recruit participants, and each individual received research credits upon study completion.

### 2.3 Materials

Participants completed the online survey using Qualtrics survey software. A participant information sheet and participant agreement form were provided, detailing study information. Demographic information requested included age and gender. A memory test was used to ensure participant engagement, including questions such as, 'What was the girl eating breakfast in front of?'. A debrief sheet was provided, consisting of study information and support numbers.

The State Self-esteem Scale [51] consisted of 20 items and measured self-esteem at a given point in time. Items included 'I feel good about myself', and 'I feel inferior to others at this moment'. Each item was assessed on a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely), with a minimum score of 20 and maximum of 100. Negatively worded items were reverse scored. Scores were summed to calculate a total score, with higher scores indicating higher self-esteem.

The Body-Esteem Scale for Adolescents and Adults [24] consisted of 23 items measuring body-esteem levels. Items included 'I like what I look like in pictures', and 'Weighing myself depresses me'. Each item was assessed using a 5-point

Likert scale ranging from 0 (never) to 4 (always), with a minimum score of 0 and maximum of 92. Negatively worded questions were reverse-scored, and a total score was calculated by summing scores. Higher total scores indicated higher body-esteem.

Target images consisted of Instagram posts containing a picture, caption and comments section. The posts were obtained through Instagram, from individuals posting outside of the UK, with usernames removed. The three assigned Instagram image conditions each contained 10 images. The first condition contained images likely to result in upward comparison occurring, including Instagram posts showing a toned body, luxurious holiday and happy couple. Each post's captions and comments followed this theme of upward comparison, such as captions including words such as 'blessed', and positive comments praising posters' bodies. The second condition contained images likely to result in downward comparison, including Instagram posts of someone crying and an overweight individual. Captions and comments were generally negative, including captions discussing being fired from a job or struggling with illness, and comments sympathising. The final neutral control condition included posts which would not elicit either upward or downward comparison, such as a stone wall and two ordinary people talking with no facial expressions visible. Captions and comments were generally both minimal and neutral, to avoid triggering social comparison.

All three Instagram image conditions were pilot tested prior to data collection, to ensure the Instagram posts elicited expected emotions. After viewing the Instagram images and posts, 10 testers reported images as 'happy' and 'perfect' (upward condition), 'sad' (downward condition) or 'neutral' and 'plain' (neutral control condition), demonstrating suitability of the images for the study.

## 2.4 Procedure

Participants signed up to the study online, providing them with a link to the online survey on Qualtrics, where they were randomly allocated to one of three conditions. Participants read through the participant information sheet and agreement form and gave consent, before answering demographic questions. Participants answered both questionnaires on self-esteem and body-esteem before spending approximately 20 min browsing through displayed Instagram images for their assigned condition. After taking part in a memory test, participants answered both questionnaires again, before reading through a debrief sheet. The study took approximately 30 min to complete.

## 2.5 Statistical analyses

A two-way mixed ANOVA was conducted to analyse the effect of Instagram image comparison level (upward, downward, neutral) and timepoint of data collection (before image exposure, after image exposure) on self-esteem levels. Significant interactions would be subjected to post-hoc tests where the alpha criterion was adjusted for multiple comparisons using Bonferroni.

## 2.6 Ethics

This study was conducted after gaining ethical approval from the University Ethics Committee. Because the current study investigated body image, it was important to recognise the potential for ethical issues to arise, such as questionnaire items potentially provoking negative thoughts about participants' own body images. To mitigate this risk, participants were provided with appropriate support details on the debrief sheet, providing access to wellbeing and talking services if required.

# 3 Results

## 3.1 Descriptive statistics

Table 1 shows decreased self-esteem and body-esteem scores after engaging in upward comparison, while self-esteem and body-esteem scores increased after engaging in downward comparison. After engaging in no comparison, self-esteem and body-esteem scores increased slightly, compared to before.



**Table 1** Mean and standard deviations for self-esteem and body-esteem scores depending on timepoint of data collection and image comparison level

Questionnaire	Image comparison level	Timepoint of data collection			
		Before image exposure		After image exposure	
		Mean	SD	Mean	SD
Self-esteem	Upward	59.81	10.304	58.44	10.905
	Downward	57.31	10.892	63.00	10.918
	Neutral	55.76	16.449	58.00	18.052
Body-esteem	Upward	65.50	10.583	60.56	11.877
	Downward	60.75	12.019	64.13	14.212
	Neutral	57.65	17.727	58.29	19.231

### 3.2 Self-esteem

The normality of self-esteem scores was assessed and the Shapiro–Wilk test, Q-Q plots and z-scores indicated scores were normally distributed for all conditions as shown in Table 2.

A two-way mixed ANOVA was conducted to analyse the effect of Instagram image comparison level (upward, downward, neutral) and timepoint of data collection (before image exposure, after image exposure) on self-esteem levels and this revealed a significant main effect of timepoint of data collection on self-esteem score,  $F(1, 46) = 5.63$ ,  $p = 0.022$ ,  $\eta_p^2 = 0.11$ . There was no significant main effect of Instagram image comparison level on self-esteem scores,  $F(2, 46) = 0.28$ ,  $p = 0.761$ ,  $\eta_p^2 = 0.01$ . There was a significant interaction between Instagram image comparison level and timepoint of data collection in terms of self-esteem,  $F(2, 46) = 4.82$ ,  $p = 0.013$ ,  $\eta_p^2 = 0.17$ . To examine this interaction, post-hoc tests were conducted, and alpha criterion was adjusted for multiple comparisons using Bonferroni ( $0.05/3 = 0.0166$ ). Results showed that in the upward comparison condition, there was no difference in self-esteem scores between before image exposure ( $M = 59.8$ ) and after image exposure ( $M = 58.4$ ),  $t(15) = 1.02$ ,  $p = 0.163$ . In the downward condition, there were significantly higher self-esteem scores after image exposure ( $M = 63$ ), compared to before image exposure ( $M = 57.3$ ),  $t(15) = -2.62$ ,  $p = 0.010$ . In the neutral condition, there was no difference in self-esteem scores between before image exposure ( $M = 55.8$ ) and after image exposure ( $M = 58$ ),  $t(16) = -2.01$ ,  $p = 0.031$ .

**Table 2** Tests of Normality for Self-esteem (SE) and Body-esteem (BE) for Before and After Scores with each Image Comparison Level (Upward, Downward and Neutral)

Esteem scores	Image comparison level	Tests of Normality			
		Kolmogorov–Smirnov		Shapiro–Wilk	
		Statistic (df)	Sig	Statistic (df)	Sig
SE before	Upward	0.118 (16)	0.200	0.936 (16)	0.302
	Downward	0.133 (16)	0.200	0.953 (16)	0.532
	Neutral	0.097 (17)	0.200	0.955 (17)	0.542
BE before	Upward	0.144 (16)	0.200	0.957 (16)	0.602
	Downward	0.106 (16)	0.200	0.962 (16)	0.707
	Neutral	0.206 (17)	0.053	0.943 (17)	0.356
SE after	Upward	0.119 (16)	0.200	0.975 (16)	0.905
	Downward	0.198 (16)	0.095	0.906 (16)	0.100
	Neutral	0.154 (17)	0.200	0.953 (16)	0.498
BE after	Upward	0.144 (16)	0.200	0.949 (16)	0.467
	Downward	0.178 (16)	0.186	0.901 (16)	0.082
	Neutral	0.129 (17)	0.200	0.945 (17)	0.382

### 3.3 Body-esteem

The normality of body-esteem scores was assessed. Table 2 shows that the Shapiro–Wilk test indicated scores were normally distributed for all conditions, alongside Q-Q plots and z-scores. A two-way mixed ANOVA was conducted to investigate the impact of Instagram image comparison level (upward, downward, neutral) and timepoint of data collection (before image exposure, after image exposure) on body-esteem levels and this revealed no significant main effect of timepoint of data collection on body-esteem,  $F(1, 46) = 0.19$ ,  $p = 0.668$ ,  $\eta_p^2 = 0.00$ . There was no significant main effect of image comparison level on body-esteem,  $F(1, 46) = 0.61$ ,  $p = 0.550$ ,  $\eta_p^2 = 0.03$ . There was a significant interaction between image comparison level and timepoint of data collection in terms of body-esteem,  $F(1, 46) = 11.77$ ,  $p < 0.001$ ,  $\eta_p^2 = 0.34$ . To examine the interaction, post-hoc tests were conducted, and alpha criterion was adjusted for multiple comparisons using Bonferroni ( $0.05/3 = 0.0166$ ). Results showed in the upward comparison condition, there were significantly lower body-esteem scores after image exposure ( $M = 60.6$ ) compared to before image exposure ( $M = 65.5$ ),  $t(15) = 4.89$ ,  $p < 0.001$ . In the downward condition, there were significantly higher body-esteem scores after image exposure ( $M = 64.1$ ) compared to before image exposure ( $M = 60.8$ ),  $t(15) = -2.42$ ,  $p = 0.014$ . In the neutral condition, there was no difference in body-esteem scores between before image exposure ( $M = 57.6$ ) and after image exposure ( $M = 58.3$ ),  $t(16) = -0.53$ ,  $p = 0.303$ .

## 4 Discussion

### 4.1 Summary of findings

In support of both hypotheses, the results indicated that self-esteem scores and body-esteem scores changed depending on the Instagram image comparison condition. Further analysis showed self-esteem and body-esteem scores significantly increased after downward comparison, with no change in self-esteem or body-esteem scores following the no comparison condition. Additionally, body-esteem scores significantly decreased after upward comparison, while self-esteem scores did not.

**Hypothesis 1** H1 was accepted as an interaction was found between Instagram image comparison level and timepoint of questionnaire administration on self-esteem rating. Additionally, post-hoc tests found engaging in downward comparison significantly increased self-esteem scores, suggesting how generally viewing negative Instagram photos and posts online is likely to immediately improve an individual's overall self-esteem. Furthermore, no difference in scores was found after engaging in no comparison, indicating no other confounding factors influenced results. This provides support for the internal validity of the study whilst also suggesting how viewing Instagram posts consisting of neutral images, such as a brick wall, is not likely to alter viewers' self-esteem positively or negatively at time of exposure.

The findings of H1 support previous research [43], which reported higher self-esteem ratings after exposure to Facebook images eliciting downward comparison. Our results provide further support for the use of social comparison theory [30] to understanding self-perceptions as a result of using social media [1, 2]. Because the present study focussed on social comparison occurring on Instagram rather than Facebook [43], the generalisability of results across different social media platforms could be suggested, due to the similarity of findings obtained. Consequently, it can be assumed that the positive impact of engaging in downward social comparison does not differ depending on the social media platform used. Regardless of the platform, social media users are likely to be able to improve self-esteem by viewing content posted by users perceived as inferior to them, which could potentially improve their overall mood too.

However, through post-hoc tests, upward social comparison was not found to significantly decrease self-esteem scores, contrary to previous research [43] which found lower self-esteem ratings after engaging in upward comparison on Facebook. This suggests social comparison theory, specifically upward social comparison, cannot explain lower levels of self-esteem in Instagram users. One potential explanation for this finding could be that upward comparison may only sometimes result in more negative self-esteem evaluations, and can sometimes also be self-esteem enhancing instead, due to individuals making upward comparisons in a desire to enhance self-esteem



assessments [52]. Alternatively, it is possible that individuals with lower self-esteem may consciously or unconsciously distort self-esteem reported answers to create false impressions of themselves [53]. That is, social desirability bias could have potentially impacted responses, with participants portraying themselves in a more favourable light [54]. Consequently, participants may have reported higher self-esteem to protect themselves from opposing perceived social norms, which is important to consider when interpreting results. However, this cannot be determined without further investigation into upward social comparison on Instagram.

**Hypothesis 2** H2 was accepted, due to finding an interaction between Instagram image comparison level and timepoint of questionnaire administration on body-esteem ratings. Post-hoc tests showed that engaging in upward comparison decreased body-esteem ratings whilst engaging in downward comparison increased body-esteem. This suggests viewing positive, desirable images on Instagram, often shared through positive self-esteem presentation [13], is likely to result in users reporting worse body image whilst viewing negative images of individuals suffering is likely to enhance body image. No difference in scores was found after engaging in neutral comparison, suggesting a social media user's body image is not affected by viewing neutral Instagram images and posts.

The results of H2 were expected and concurrent with previous research [29], which found increased body dissatisfaction after viewing attractive celebrity and peer images compared to control images. Because our study used an Instagram format instead of a slideshow when presenting images to participants, unlike earlier research [29], it can be proposed that exposure to positive and negative images can affect body image across social media sites such as Instagram. Our findings provide support for social comparison theory [30].

## 4.2 Implications

The findings of this study have important implications as they indicate that individuals may use social media to increase their self-esteem or body-esteem by engaging in downward comparison online [39], either intentionally or not. This could potentially explain why adolescents and young adults have been found to be increasingly dependent on social media sites such as Instagram [55], especially during the COVID-19 pandemic [3, 56]. In contrast, the impact that engaging in upward comparison may be more negative. Because engaging in upward comparison offline is associated with disordered eating thoughts and behaviours in both adults [34] and adolescents [35], attempting to reduce instances of online upward comparison with someone perceived as thinner or healthier could subsequently reduce the risk of diminished body-esteem, potentially helping to reduce the number of individuals struggling with eating disorders or engaging in disordered eating. This is particularly important when considering the presence of children on social media sites, who may be younger than the age restrictions enforced by specific platforms. Instagram or Snapchat use prior to age 11 has been related to more problematic digital behaviours [57], which could potentially increase the likelihood of exposure to desirable images and subsequent engagement in upward comparison. Limiting social media access in young children has been shown to minimise some of the negative effects of early social media use [57], however limiting screentime and daily usage of social networking sites is often not possible to do. Although, perhaps providing warnings to users after they have been active on social media for long periods, reminding them to take a break could help. By understanding this link and informing the public about it, such as through informative social media campaigns, the type of content that individuals choose to share online could be influenced, with the potential for more individuals, including social media influencers, to consider the impact on others of what they choose to post online. Consequently, some may choose to share more realistic, unedited posts, allowing users to relate more to the poster and subsequently improve their self-esteem and body-esteem, which could potentially also motivate some users to repair their negative mood [21]. In schools, teachers could educate young people about the likelihood that they will be viewing overly positive images on social media.

By understanding the link between social comparison on Instagram and body-esteem, assessment and intervention strategies for eating disorders could be adapted to better recognise how an individual may have been influenced by what they have viewed online. Through educating practitioners, they may be able to tailor psychological treatment, such as 'enhanced' cognitive behavioural therapy for eating disorders [58], by addressing patterns of online social comparison and the obstacles faced as a result of exposure to images perceived as superior to one-self online. Similarly, treatment options for children and adolescents with disordered eating, as well as other mental health difficulties such as depression and anxiety, could be adapted to acknowledge online social comparison as a prominent risk factor with significant potential to affect mental wellbeing. Although cognitive behavioural therapy is unlikely to result in avoidance of exposure to these images on social media, it may potentially minimise any harmful effects that may occur as a result, as well as

improving psychological resilience through learning appropriate coping strategies [59]. Other techniques have already been shown to ameliorate the impacts of social media on body image and these could be further researched across different age groups and cultural contexts [60]. For example, Hooper et al. [10] showed that a 10-min mindfulness meditation intervention significantly increased self-esteem, body appreciation scores and positive mood and reduced negative mood, compared to those in the control group. Finally, social media organisations could provide access to resources which provide advice about healthy eating and support for individuals wanting to discuss body image issues. Future research could potentially establish if participants' views about eating change after engaging in differing levels of social comparison on Instagram.

### 4.3 Strengths, limitations and future research

This study used online questionnaires to ensure increased anonymity when participants responded, meaning they may have felt more inclined to be honest than if the study had taken place in a laboratory with an experimenter present [61]. Both questionnaires used in this study have been empirically validated [62, 63], ensuring enhanced validity of results. However, the use of multiple Likert scales in questionnaires may have potentially resulted in the occurrence of 'end aversion bias', where participants tend not to mark the two extreme ends of a scale, also known as central tendency bias [64]. Also, participants may have some memory of completing the tests a second time with such a short interval in-between, future research should take place over a longer time period. Another strength of the study is that unlike previous research [43], it exposed participants to multiple Instagram images per social comparison condition, showcasing a variety of different individuals online, alongside including a neutral control condition to ensure study validity. However, the current study did not itself investigate the relationship between social comparison on Instagram and disordered eating. Future research could investigate whether participants' eating views changed after engaging in differing levels of social comparison on Instagram, alongside reported self-esteem and body-esteem.

## 5 Conclusion

This study contributes to the pre-existing literature by providing an in-depth understanding of the impact of different types of social comparison on Instagram on self-esteem and body-esteem perception. Results indicated how both self-esteem and body-esteem perceptions changed depending on the type of social comparison engaged in. Therefore, it can be concluded that in this study viewing Instagram images eliciting upward comparison decreased perceptions of body-esteem, which could potentially result in negative thoughts and behaviours. In contrast, engaging in downward comparison increased self-esteem and body-esteem, potentially improving users' wellbeing. This highlights the potential impact of Instagram content, and the importance of educators, young people and practitioners being aware of the risks and mitigating the potential impacts that may arise for social media users.

**Author contributions** Georgina Armes and Jacqui Taylor jointly contributed to the study conception and design. Material preparation, data collection and analysis were performed by Georgina Armes, under the supervision of Jacqui Taylor. The first draft of the manuscript was written by Georgina Armes and Jacqui Taylor significantly revised this version of the manuscript. Georgina Armes then accepted the changes and then Jacqui Taylor revised further to fit with the journal aims more specifically. All authors read and approved the final manuscript. Jacqui Taylor then submitted the manuscript and dealt with all reviewer comments.

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**Data availability** The datasets generated during and/or analysed during the current study are not available.

**Code availability** Not applicable.

### Declarations

**Ethics approval and consent to participate** Approval was obtained from the Research Ethics Committee of the University of Bournemouth (ID number 41426). The procedures used in this study adhere to the tenets of the Declaration of Helsinki. Informed consent was obtained from all individual participants included in the study.

**Competing interests** The authors have no relevant financial to disclose. The author Jacqui Taylor is on the Editorial Board for Discover Psychology.

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