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Abstract

Social media has affected how we relate to our body image. Digital makeovers have both reinforced existing beauty ideals and created new ones. This project investigated whether young adults' detection of image filters was biased by internalized beauty ideals and gender. Participants completed a visual detection task (forced choice paradigm) where contrast filter correction was assessed for images of male and female bodies that were thin, average, and curvaceous/muscular. Results showed that people can detect filters and that accuracy is higher when filters are applied to bodies that represent the historical beauty ideals: thin female bodies and muscular male bodies. These findings suggest that the perception of low-level image features is biased to fit internalized beliefs about beauty.

Keywords: social media; Instagram; filters; beauty ideals; body image.

Introduction

The expansion of digital technologies has changed the dynamics of visual culture. Less than a decade ago, taking and sharing a photograph required knowledge of specialized software, nowadays it has become routine. Young adults are deeply involved in creating and consuming visual content as an integral part of their everyday lives (Hand, 2020, pp. 310-320). People choose how they present themselves and their day-to-day to the world: what to capture, when, where, and how depending on their preferences (Jurgenson, 2019, pp. 1-28). Instagram, for instance, allows users to publish and update content and has the "Search and Browse" tab that showcases images and videos from public profiles. This feature exposes users to new content effortlessly; it eliminates the need for targeted searches and fosters spontaneous social comparison, which can contribute to poor self-perception (Sherlock & Wagstaff, 2019). 'Showcasing' is particularly attractive to adolescents, who often imagine a virtual audience and act accordingly to enhance their physical appearance (Zheng et al., 2019). Enhancements to physical appearance follow idealized cultural beliefs about attractiveness (Choukas-Bradley et al., 2022) and are achieved by a process of filtering and editing images. This project aims to explore to what extent social media users can detect the presence of filters and whether their detection is biased by internalized beauty ideals.

Image enhancing serves other purposes besides 'making one look better'; it facilitates the visual processing of an image by highlighting valuable information and reducing unnecessary elements (Qi et al., 2022). For instance, applying low light to images helps refine the local and overall contrast of the image; it avoids noise and enhances the main object or person in the image (Wang et al., 2020). Brightness provides important perceptual information via changes in the apparent color difference within objects and surfaces in the image. It can also result in different perceptual experiences for viewers, with brighter pictures evaluated more positively than their darker versions (Lakens et al., 2013). Within this literature, visual perception refers to a top-down mental process by which individuals choose, organize, and interpret incoming information to create an overall understanding of the visual input (Amalia et al., 2023). As the complexity of the input increases, people tend to pay attention to and reflect more on specific details (Fazio et al., 1994). During this processing, intrinsic motivations and preferences guide attention to features of the stimuli (Stankevich, 2017). These motivations and preferences are shaped over time by cultural transmission through social learning and teaching mechanisms (e.g., imitation, mimicry, and instruction; Kanngiesser et al., 2022). Perception can therefore be

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conceived as a highly personalized process where individual differences in how we perceive and think about the world are expressed (Yama et al., 2022).

Cultural transmission minimizes individuality and shapes individuals' motivations and preferences to fit predominant beliefs and opinions. This homogenization of beliefs at a global scale is one of the byproducts of the social media era. Cultural transmission within social networks involves the sharing and posting of cultural products that others can comment on. Body images are one such product; they are often chosen, manipulated, and filtered to express individual differences, conformity with societal ideals, or to promote a social agenda. For instance, news outlets regularly choose 'ugly' images of public figures to increase viewership and promote their ideological beliefs. People make similar choices when curating their social media content and give themselves digital makeovers with minimal effort. Users engage in makeovers to look more attractive, enjoyable, distinctive, and unique to other platform users (Bakhshi et al., 2015). Makeovers oblige cultural standards of what is considered beautiful and have a central role in promoting and maintaining cultural beauty ideals (Franchina & Coco, 2018).

Filters used in digital makeovers rely on altering photographic features, primarily contrast, brightness, and saturation (Hong et al., 2020). Before the pandemic, Instagram offered 20 different filters to improve images (Youn, 2019)— their number and availability have continued to grow exponentially since then. In 2019, Juno was voted the most flattering filter by women aged 30 to 50; it brightened their appearance, improved light colors, and created a smooth facial look. It also highlighted some dark colors, resulting in photos with a deep and warm tone. Younger women also prefer manipulated photos over original ones and accept changes in body shape as realistic (Kleemans et al., 2018).

Snapchat filters—referred to as lenses—distinguished themselves from traditional photo makeovers. Originally, lenses were used as playful enhancements for photos and videos. Within a few months, they evolved beyond conventional adjustments, allowing users to modify their facial features (enlarging the eyes and narrowing the chin) and to add whimsical elements (bunny ears, colorful hair, or oversized glasses). The culture surrounding these lenses appeared harmless, leading to their widespread adoption. In response, Instagram and Facebook offered users filters and picture-editing tools that also allowed for facial manipulation. The rapid introduction of these changes promoted novel and unrealistic beauty standards beyond traditional beauty ideals (Maqsood & Sangra, 2021).

Beauty ideal internalization refers to the extent to which an individual shapes their values and beliefs in alignment to cultural and collective values and beliefs about beauty (Kidd et al., 2023). "Beauty ideals" have changed in the new century with the emergence of social media; prevalent notions of beauty have been strengthened and new beauty ideals have emerged. Younger users are more vulnerable to these changes. Although beauty ideals are internalized and updated throughout the lifespan, they have a higher impact on those undergoing bodily changes—such as those experienced during adolescence and young adulthood—that require body image constant updating. Historically, the thinness ideal has been predominant for women (Garousi et al., 2016) to this day (Kidd et al., 2023); however, social media has given a forum to both the athletic body ideal promoted by fitspiration (Deighton-Smith & Bell, 2018) and the curvy beauty ideal also known as slim-thick promoted by body positivity (McComb & Mills, 2022). Amongst young men, the established ideal advocates a slender, muscular, and V-shaped body (Edwards et al., 2016; Voges et al., 2019). In line with changes in beauty ideals, new filters have emerged to help users portray them; this has exacerbated body image concerns (Stein et al., 2021) and impaired self-esteem (Jiang & Ngien, 2020).

The interaction between the use of filters and internalized beauty ideals is a complex issue; whereas internalized beauty ideals lead users to engage in filter use, and exposure to filtered images reinforces pre-existing ideals (Siddiqui, 2021). In our previous work, we found that young people are sensitive to filters that change the body's shape. Filter recognition is more accurate and faster when the image is filtered to conform to beauty ideals (thin body for women and muscular body for men) (Flores Bravo et al., 2023). However, in this study, a small set of images was given a digital makeover to either approach or depart from the ideal. As a result, it is hard to disentangle whether users' filter detection responds to an awareness of a body image being unrealistically manipulated or biased by internalized ideals.

The current project aimed to investigate whether internalized beauty ideals bias filter detection. To achieve this aim, we first built a stimulus set of non-filtered photos representing three body types for each gender: thin, average, and muscular/curvaceous. A simple manipulation was applied to increase or reduce contrast, which had the effect of obscuring or enhancing body features. Image enhancement results in aspects of the image appearing more prominent (e.g., increased visual contrast around the breasts or abdominal muscles making them appear larger), while image contrast reduction flattens the image and diminishes the relative saliency of physical attributes. We expected that if beauty ideals affect filter detection, perceivers would respond differently to the presence of filters for different body types. Bodies that conform to the predominant beauty ideal for each gender would show higher filter detection rates, suggesting that perceivers expect filters to enhance body features that conform with the ideal and obscure body features that depart from it.

Methods

Participants

40 participants (20 cis females) ages between 18 and 35 (M= 24, SD= 3.46) participated in this study. Sample size was determined based on design requirements (forced-choice paradigm; see Huang & Ferreira, 2020 for a discussion). Because of the diversity of body image and beauty beliefs in non-binary populations (Monteiro et al., 2019), we opted to restrict this study to focus on binary cis-gender

heteronormative subjects. All participants had normal or corrected to normal vision and were recruited through posts on social media and WhatsApp groups. Informed consent was provided before the beginning of the study. Protocol and consent forms were approved by the ethics committee of Fundación Favaloro (approval number CBE 940/21). Inclusion criteria for the final sample were age (18 to 35 years), identifying as cisgender, and absence of medically diagnosed body image or eating disorders. Participants received no monetary or other compensation for participating in the study.

Materials and Procedure

This project was pre-registered at https://doi.org/10.17605/OSF.IO/DGQYN Participants completed a brief sociodemographic questionnaire and The Appearance-Related Social Media Consciousness Scale (AMSC) (Choukas-Bradley et al., 2020) on Google Form. Once finished, they were re-directed from the form to an online experimental platform (Pavlovia.org) to complete the study. All procedures were conducted in person and monitored by a researcher.

Sociodemographic questionnaire. The questionnaire asked about age, education, place of birth, residence, sex, gender, history of body image and eating disorders, and social media use. Social media use was operationalized in terms of frequency of use, content upload, content editing, and specific use of the platforms Instagram, TikTok, and BeReal.

The Appearance-Related Social Media Consciousness Scale (AMSC). This questionnaire assesses individuals' awareness of their appearance when posting a picture of themselves on social media. First formulated by Choukas-Bradley et al. (2020), the Spanish version is currently under review (Abrevaya et al., under review). This scale aims to capture how a person imagines their body its perceived by the social media audience, the frequency with which they check and monitor their own body and its physical changes, and the frequency with which they add filters to the content they publish in social media. The ASMC is composed of 13 items and responses are obtained on a 7-point Likert Scale (1=Never, 2= Almost Never, 3= Rarely, 4= Sometimes, 5= Often, 6= Almost Always, 7=Always). The final score results from the average of all responses; the higher the score, the higher the person's awareness of their appearance on social media.

Stimuli Set Construction. An online survey was first administered to determine a set of stimuli that represented three distinct female and male body types: thin, average, and muscular/curvaceous. 100 participants (70 females; *M*=25.07 yrs. *SD*=4.10 yrs.) evaluated 60 images (30 female and 30 male) (4.04 cm in width x 5.63 cm in height). Photographs were obtained from free photo banks (Pexels, Pixabay, Wikimedia Commons, and iStock); they depicted beach scenes with one person either posing or playing a sport while wearing a bikini (females) or swimming trunks (males). Upon seeing each photo, participants were asked to score them on two Likert scales. First, they gave a score on how thin (0) or curvaceous (10) a body appeared. Secondly, they were asked to score from 0-10 on how much the body depicted approached the beauty ideal for that gender. The survey was conducted using Google Forms and the images were presented in random order.

Based on the responses obtained, 5 pictures were selected depending on the scores they received on the thinness-muscularity/curvaceousness spectrum for each gender and each body type (see Figure 1). Overall, female stimuli were rated lower than male stimuli on the thin-curvaceous scale. Participants did not use the full scale when scoring female bodies, avoiding high thinness or curvaceous rates. For males, scores of 0-3 were considered thin (*M*=3.21, *SD*=0.67), scores 4-7 were considered average (*M*=5.32, *SD*=0.71), and scores 8-10 were considered curvy or muscular (*M*=8.16, *SD*=0.67). For females, scores from 2-3 were considered thin (*M*=3.12, *SD*=0.68), scores 4-5 were considered average (*M*=4.93, *SD*=0.63), and scores 6-7 were considered curvaceous (*M*=6.92, *SD*=0.35). To determine the prevailing beauty ideal, female and male images that approached a score of 10 on the scale were taken to represent the prevailing beauty ideals in the population. The female body ideal was evaluated as average in the first assessment (*M*=4.48, *SD*=1.80) and the closest to the beauty ideal (*M*=7.51, *SD*=1.89) The male body ideal was rated as muscular (*M*=7.62, *SD*=1.85) and closest to the beauty ideal (*M*=8.28, *SD*=1.73) (see Figure 2).

Figure 1: Examples of images picked for each body type category

Filter Detection Task. Participants completed a computer task and were asked to sit upwards, screen placed 45 cm away and at the center of their eyesight. At the beginning of the experiment, the researcher explained the instructions and provided participants with 8 practice trials to familiarize them

with the task. All images were presented via Psychopy (Peirce et al., 2022) and were uploaded to Pavlovia.org.

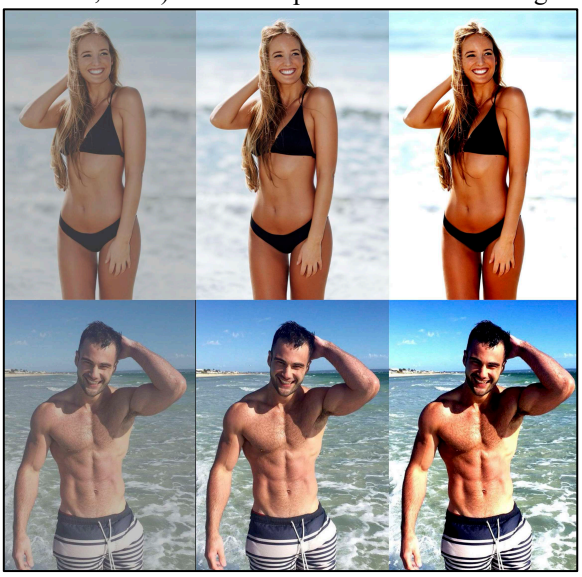

Figure 2: Beauty body ideals for each gender (center picture) with the reduced contrast (left picture) and increased contrast (right picture) applied.

The task employed a force-choice paradigm. On each trial, participants were presented with an image at the center of the screen and asked to respond by pressing the left arrow on the keyboard if they thought the image was filtered and the right arrow if they thought it wasn't. After each response, a screen with a black fixation cross appeared for 1 second (see Figure 1). Participants completed 90 fully randomized experimental trials (5 for each female and 5 for each male body type in their original, enhanced, and reduced contrast) (see Figure 3).

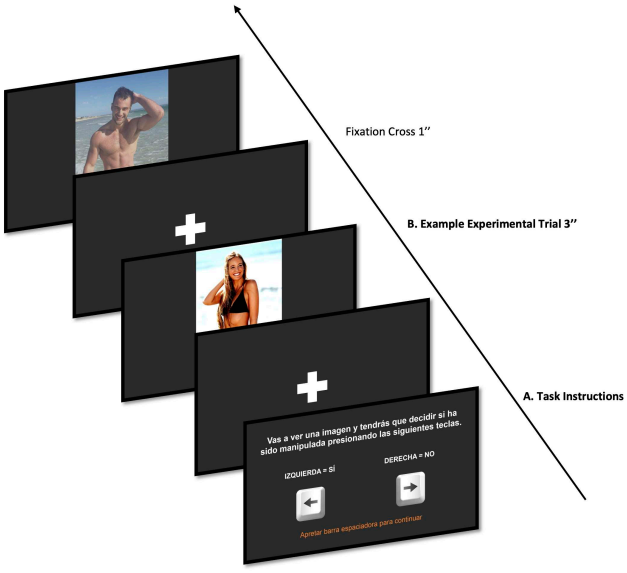

Figure 3: Pictorial depiction of the experimental task.

Results

Experimental Task. Accuracy (% of correct responses) and Reaction times (RT) were analyzed in mixed ANOVAs with body type (average, thin, and curvaceous-muscular), filter type (no filter, reduced contrast, and increased contrast), and gender of the stimuli as within-subject factors, and participant's gender as a between-subject factor. Results of accuracy analyses showed a significant interaction between filter type and gender of the stimuli [$F(2,76)=8.201$, $p=0.001$, $n_p^2=0.019$] and a significant interaction between body type and gender of the stimuli [$F(2,76)=5.19$, $p=0.008$, $n_p^2=0.007$). No other significant effects or interactions were found.

To follow up on the interaction between filter type and gender of the stimuli, we conducted a repeated measures ANOVA on the average responses obtained for each filter type and gender. Significant interactions were found between filter type and the gender of the stimulus [$F(2,78)=8.43$, $p=<0.001$, $n_p^2=0.031$]. For the female stimuli, post-hoc Durbin-Conover correction, $X^2_{Friedman}(5)=30.4$, showed that participants identified as filtered significantly more images with reduced contrast ($M=0.72$, $SD=0.22$) [$t(39)=4.29$, $p<0.00$] and with increased contrast ($M=0.75$, $SD=0.20$) [$t(39)=4.25$, $p<0.001$] compared to non-manipulated images ($M=0.57$, $SD=0.20$). Participants identified as filtered significantly more male photos manipulated to increase contrast compared to those manipulated to reduced contrast (increased contrast: $M=0.74$, $SD=0.17$, reduced contrast: $M=0.61$, $SD=0.25$) [$t(39)=3.18$,$p=0.002$]. Finally, comparisons between male and female stimuli showed that participants identified as filtered significantly more female than male images when manipulated to reduce contrast (female: $M=0.72$, $SD=0.22$, male: $M=0.61$, $SD=0.25$) [$t(39)=3.44$, $p<0.001$]. The same was found when comparing detection rates between non-manipulated female and male photos; non-manipulated female photos were incorrectly identified as manipulated significantly more than male photos (female: $M=0.57$, $SD=0.20$, male: $M=0.64$, $SD=0.21$) [$t(39)=2.56$, $p=0.011$].

To follow up on the interaction between body type and gender of the stimuli, we conducted a repeated measures ANOVA on the mean responses obtained for each body type in both genders. A significant interaction was found between the body type and the gender of the stimulus [$F(2,78) = 5.25$, $p=0.007$, $n_p^2=0.023$]. Post hoc Durbin - Conover correction, $X^2_{Friedman}(5)=12.1$, showed that participants identified thin female bodies as filtered significantly more than thin male bodies (female $=M=0.70$, $SD=0.16$; male $=M=0.63$, $SD=0.16$) [$t(39)=3.10$, p=0.002], and muscular male bodies significantly more than thin male bodies (muscular $=M=0.69$, $SD=0.14$; thin $=M=0.63$, $SD=0.16$) [$t(39)=2.63$, $p=0.009$].

RT analysis showed a main effect for filter type [$F(2,76)=29.165$, $p=0.001$, $n_p^2=0.062$]; participants respond significantly faster in the reduced contrast compared to no-manipulation condition (reduced contrast= $M=1.33$, $SD=0.29$; no manipulation= $M=1.52$, $SD=0.25$) [$t(39)=6.845$, $p<0.0001$] and in the increased contrast compared to no-

manipulation condition (increased contrast= M=1.35, SD=0.23) [t(39)=6.945, p<0.001]. No other significant main effects or interactions were found.

Social Media Use. Responses to the sociodemographic questionnaire showed that women and men spend about the same number of hours on Instagram (Women=M=2.52, SD=1.65; Men=M=2.41, SD=1.80) and tend to upload a similar amount of content to this platform (85% women; 70% men). However, when asked if they usually filter the content they upload, women responded that they used filters more than men (90% of women; 35% of men). TikTok is used more by women (Women=M=1.41, SD=1.49; Men=M=0.65, SD=0.93); however, only two female participants expressed uploading and editing content on the platform, while the rest of the participants mainly observed without uploading. As for Be Real, no usage was reported.

Linear Regression Analyses. Multiple linear regression was performed separately for each body type and filter with age, time spent on Instagram and TikTok, and the score obtained on the ASMC as predictors. Results showed that the score on the ASMC significantly predicted accuracy when deciding if both the thin, R^2= 0.27, F(4,35)= 12.15, p=0.001 and muscular, R^2= 0.21, F(4,35)=4.20, p=0.048, non-manipulated bodies were filtered; participants with a higher consciousness of their appearance on social media were more successful in identifying when male photos of thin and muscular bodies were filtered. Age significantly predicted accuracy when seeing the average female body with an increased contrast R^2= 0.12, F(4,35)=4.17, p=0.049. No other analysis showed significant results.

Discussion

The goal of this study was to explore the relationship between filter detection and internalized beauty ideals. Visual detection of a contrast filter correction was assessed for images of male and female bodies that were thin, average, or curvaceous/muscular. Participants could accurately detect the presence of filters used to reduce and increase contrast, and their responses were faster when filters were present. As we expected, filter detection was to some extent biased by beauty ideals for both genders. Thin female bodies were more likely to be identified as filtered compared to thin male bodies and muscular male bodies were correctly identified as filtered significantly more than thin male bodies. These results suggest that when observing a female image, people have a higher expectation that thin bodies are filtered, and when observing a male image, the expectation is that muscular bodies are filtered.

The female beauty ideal revolves primarily around losing and maintaining a lean body (Weinbach et al., 2023). Male beauty ideals are shaped by two concerns: fear of gaining weight and desire to achieve a lean and toned body (Ralph-Nearman & Filik, 2018). Responses to the presence of filters were consistent with the expectations internalized by both ideals created for both genders. Participants found it easier to recognize filters applied to thin female bodies and muscular male bodies. These two body types are consistent with contemporary beauty standards (Hanan & Fatima, 2023; Talbot & Mahlberg, 2023); this suggests that filter detection is higher when applied to beauty ideals. Moreover, linear regression results provide additional support to the notion that filter detection might have been biased by internalized beauty ideals. Participants with a higher consciousness of their appearance on social media were more successful in identifying when photos of thin and muscular bodies were filtered.

Gender provided participants with a stronger clue as to the presence of filters than other characteristics of the image. When observing female images, participants could detect the reduced and increased contrast filters but incorrectly identified non-filtered images as filtered. This suggests a general bias towards expecting female bodies to be filtered; this bias is in line with filters being used more prevalently by female participants in our sample. In general, women engage more in photo manipulation (Lee & Lee, 2019) and women who frequently edit their photos engage more in appearance comparison (Lee & Lee, 2021). Moreover, women pay more attention to beauty content, which induces appearance comparison and reinforces internalized beauty ideals (Mancin et al., 2023).

Male bodies were correctly identified as filtered significantly more when the filter applied increased the saliency of body features compared to when it reduced it. This finding is consistent with people's understanding of male beauty ideas—male photos are edited to enhance muscularity (Gibbs, 2023)—and a general preference for this type of filter; increased contrast is considered more aesthetically pleasing and people engage more with this type of photo (Bakhshi et al., 2015; Tinio et al., 2011). Thus, this result could be attributed to the internalized beauty ideal of muscularity biasing responses. A caveat to this interpretation is that responses might have reflected participants' expectations about what a male body with a makeover 'should look like' and not their experience with filtered images. Male images are less available than female images on social media; in general, males use filters significantly less than females and tend to post images they perceive as attractive, authentic, and non-manipulated (Waling et al., 2023).

Conclusions

Taken together, the results of this study suggest that people can detect when a photo has been filtered. They also provide evidence that our perception of bodies is shaped by cultural expectations around beauty. We can recognize when an image has been filtered, though detection is biased by gender—female bodies are incorrectly identified as filtered when they are not. Detection is also more successful for filters that increase contrast and accentuate body features. These manipulations make it easier to identify filters applied to bodies that conform to beauty ideals (thin ideal for women and muscularity for men). Future studies should explore the distinct effects that engaging in social media makeovers has on males and females and the beauty expectations that they foster on internet users of both genders.

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