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The Effects of Engaging in Digital Photo Modifications and Receiving Favorable Comments on Women’s Selfies Shared on Social Media

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Highlights:

- Women who share selfies on social media can experience negative consequences.
- Modifying selfies led to less appearance satisfaction and interest in cosmetic surgery.
- Receiving appearance comments on selfies heightened self-objectification.
- Self-objectification increased likelihood of sharing selfies in the future.
PHOTO MODIFICATIONS AND COMMENTS ON SELFIES

Abstract

The present study explores how the construction and distribution of selfies might interact with features of newer media to affect women who share selfies on social media. In particular, this study focuses on how specific types of photo modification and the nature of favorable audience feedback received on one’s images might exert influence on women’s state self-objectification and body image concerns. A 3 x 2 between-subjects lab experiment was conducted to explore how the type of photo modification (appearance modifications, nonappearance modifications, or no modifications [control]) and nature of positive feedback (appearance comments vs. nonappearance comments) affect state self-objectification, state appearance satisfaction, pro-cosmetic surgery attitudes, and willingness to distribute selfies on social media in the future. Results indicate that modifying selfies leads to less appearance satisfaction and lower pro-cosmetic surgery attitudes. Receiving appearance comments on selfies heightens state self-objectification, regardless of the type of photo modification. In addition, the more women self-objectified, the more inclined they were to share similarly objectifying selfies on social media in the future. The findings of this work provide a more comprehensive understanding of how women are impacted by the images they share online.

Keywords: selfie; social media; photo editing; appearance commentary; self-objectification; Instagram
The Effects of Engaging in Digital Photo Modifications and Receiving Favorable Comments on Women’s Selfies Shared on Social Media

1. Introduction

As communication technologies continue to evolve, it is important to understand how such technologies affect one’s self-concept and social interactions. A broad body of literature aims to explain the effects of the media and social interactions on the development of body image concerns, primarily among women (Fredrickson & Roberts, 1997). Scholarly work on the objectification of women demonstrates that sexually objectifying experiences, such as being physically inspected by others and receiving comments on one’s appearance, cause women to become preoccupied with their appearance (Moradi & Huang, 2008). This preoccupation often leaves women feeling negatively about themselves as societal beauty ideals and standards of attractiveness are typically unattainable or unsustainable.

A notable departure from earlier media effects research is that women are not only consumers of media messages but also regular producers of such content. The widespread adoption of self-presentational online platforms, such as social media sites, encourages users to construct online identities. An increasingly ubiquitous form of photographic self-presentation is the act of capturing images of and by oneself—commonly referred to as selfies (Senft & Baym, 2015). The front-facing camera feature on smartphones enables individuals to efficiently take, modify (via built-in camera features or photo-editing apps), and share pictures of themselves with an audience (Marwick, 2015). Selfies are common and frequently shared on photo-sharing social media sites (YouGov, 2018), despite the fact that viewers tend to evaluate these photos negatively and attribute their production to narcissism (e.g., Krämer et al., 2017; McCain et al., 2016; Moon et al., 2016). Although past research has examined how people view and evaluate
selfies, less is known about how the construction and distribution of selfies affects women who engage in this form of online self-presentation (Lonergan et al., 2019; McLean et al., 2015; Terán et al., 2020; Tiggemann et al., 2020; Veldhuis et al., 2020).

The objectification literature provides incomplete explanations as to how the production of selfies might interact with features of newer media to produce certain effects. Although the acts of capturing and selecting selfies might temporarily direct attention toward one’s physical appearance, there are two social media features that warrant further attention. First, photo editing tools—particularly those that allow users to modify one’s appearance and potentially conform to perpetuated beauty ideals—should increase one’s scrutiny over one’s appearance and physical attractiveness. Photo-sharing social media sites (e.g., Instagram) and photo-editing apps (e.g., Facetune) allow users to further filter, reshape, retouch, and ostensibly, enhance these self-depictions. For example, many photo platforms contain built-in tools to modify facial and body features (e.g., resizing, reshaping), as well as the appearance of skin and complexion. Although various tools exist to modify one’s images, engaging in certain types of photo modification might draw greater attention to one’s perceived physical imperfections and perhaps increase interest in modifying one’s physical appearance offline in the form of cosmetic procedures (e.g., Chen et al., 2019; Rajanala et al., 2018; Shome et al., 2020).

Second, images shared with an online audience introduce the opportunity for feedback and commentary. Though objectification theory explains how appearance commentary in face-to-face interactions can cause women to focus greater attention on their physical appearance, it is important to consider how such commentary translates to online contexts where appearance comments are oftentimes persistent and visible to a broad audience. Given selfies are used to construct and display a narrative of the self for large audiences (Kozinets et al., 2017), the digital
modifications that occur during the construction process and the feedback received from viewers could have substantive effects for female body image.

The purpose of this study is to explore conditions under which selfies lead to more or less problematic body image outcomes for producers; as such, it contributes to the literature in several important ways. First, this work takes a more nuanced approach by considering how features of newer media might extend and challenge predictions derived from objectification theory. Communication technologies, such as photo-editing apps, are increasingly becoming more sophisticated in their ability to make major physical modifications possible with relative ease; enhancements that are greater than what can typically take place offline without cosmetic procedures. Currently, research has yet to explore whether the prolonged exposure to oneself during the editing process or the specific types of photo modifications people make on their images produce differential outcomes. Second, few studies have empirically investigated the effects of the construction process and distribution of selfies (e.g., Fox et al., 2021; Mills et al., 2018; Shin et al., 2017). The current study takes an initial exploration into how women are impacted by modifying their selfies and receiving favorable comments from an online audience to determine conditions under which the producer and audience interact to impact women’s body image.

1.1. **Selfies as Self-Presentation**

Selfies are an increasingly pervasive form of online self-presentation (YouGov, 2018). The act of taking selfies typically involves enabling the front-facing feature on a smartphone or using a reflective surface (e.g., mirror) to photograph oneself. Unlike pictures of oneself taken by others, the photographer has great control over the construction process (Diefenbach & Christoforakos, 2017), such as the ability to control the camera angle and perhaps retake
numerous photos to select the optimal one.

Two complementary theoretical perspectives provide insight into how selfies might impact women. Objectification theory provides explanations for how objectifying first-hand experiences (e.g., sexually objectifying gaze, appearance commentary) shape women’s self-concept through self-objectification. Self-objectification occurs when a woman views her physical self from the position of observers (Bartky, 1990). Specific contexts may heighten self-objectification in the moment (i.e., state self-objectification; Fredrickson et al., 1998), such as seeing one’s reflection in a mirror or being photographed (Plant & Ryan, 1985). Research suggests that self-objectification is associated with negative psychological consequences (e.g., appearance dissatisfaction) and severe mental health risks for women (e.g., disordered eating, depression; Fredrickson et al., 1998). Further, body dissatisfaction is linked to increased interest in cosmetic surgery (e.g., Park et al., 2009). Through the lens of objectification theory, selfies are inherently objectifying self-presentations: The face or body is the target to be captured, viewed, and evaluated. Objectification research suggests these appearance-focused self-presentations amplify self-objectification and result in negative psychological consequences (e.g., Chua & Chang, 2016; Cohen et al., 2017, 2018; Meier & Gray, 2013; Saunders & Eaton, 2018; Shin et al., 2017; Wang et al., 2017).

In a similar vein, objective self-awareness theory (Duval & Wicklund, 1972) assumes that individuals sometimes experience themselves as objects and engage in social comparisons. This self-comparative process oftentimes leads to a reduction of self-esteem as people tend to fall short of these societal standards. Research has evoked objective self-awareness through showing one’s reflection in a mirror (Fejfar & Hoyle, 2000; Ickes et al., 1973), pointing a video camera (Duval et al., 1992), being photographed (Plant & Ryan, 1985), and presenting images of oneself.
Whereas objective self-awareness theory explains temporary or state shifts in self-perception, objectification theory proposes this self-awareness becomes ingrained in women’s self-concept. Several experiments have manipulated women’s body self-consciousness via mirrors or observers and found it induced body shame and restrained eating (Fredrickson et al., 1998; Polivy et al., 1986; Heatherton et al., 1993).

Selfies are analogous to these different methods of inducing self-awareness and body consciousness in that the photographer typically uses a front-facing camera which shows a reflection of oneself. The front-facing camera or reverse camera feature perhaps serves as another means to evaluate or inspect one’s own body as an object, or rather a self-objectifying gaze. Moreover, selfies taken to be shared with an online audience might cause individuals to imagine their audience (Litt, 2012; Marwick & boyd, 2010) and facilitate an imagined objectifying gaze. Thus, selfies should not only serve as means of portraying oneself, but also heighten objective self-awareness, reduce one’s self-esteem, and may lead to negative body image outcomes (e.g., Mercurio & Landry, 2008; Tylka & Sabik, 2010). However, research on self-presentation, in general, can help explain why people readily share selfies online despite the potential for negative psychological and interpersonal consequences.

Baumeister (1982) identifies two central self-presentational motives that guide social behavior: (a) to please an audience, and (b) to construct one’s public image in a manner that is congruent to one’s ideal. Self-presentational motives and their effects on individuals may be even more pronounced online as users can selectively craft and receive feedback on their idealized self-presentations. On one hand, research on identity shift places emphasis on the publicness of online self-presentations (Gonzales & Hancock, 2008) and how confirming feedback (Walther et al., 2011) shapes one’s self-concept. People strive to appear favorably and
consistent in their self-presentations. On the other hand, the objectification literature specifies that women internalize appearance-centric feedback and consequently might be preoccupied with their appearance. Thus, it is valuable to explore how appearance feedback might propagate objectified self-concepts. Consequently, the present study explores two features of newer media—digital photo modifications and favorable comments—that might challenge or extend our current understanding of the antecedents and consequences of the production and dissemination of selfies online.

1.2. Effects of Digital Photo Modifications

Although capturing selfies should heighten one’s self-awareness and state self-objectification, the ability to modify one’s images might exacerbate these negative effects. Considerable research documents how exposure to digitally modified media content negatively impacts female viewers (e.g., Bury et al., 2014; 2016a; 2016b; Kleemans et al., 2018). Less research has focused on the extent to which digitally modifying one’s own photos impacts one’s self-concept. Professional photo editing practices once reserved to mainstream media sources—such as reshaping and retouching tools—are now in the hands of anyone with a smartphone. It is common for users to exploit these photo editing features; in fact, most viewers default perception of social media images is that they are likely edited (Marwick, 2015; Vendemia & DeAndrea, 2018). Women especially may choose to use photo editing features embedded in social media platforms and apps to enhance their images in a variety of ways (Fox & Vendemia, 2016). Digital photo enhancements and asynchronous production allow users to put their best face (and body) forward for others to critique. However, these photo practices may make content producers more conscious of their own appearance (Fox & Rooney, 2015); thus, taking and subsequently modifying selfies should result in less favorable body image outcomes as one
scrutinizes their physical appearance. In particular, virtual photo modifications may not only lead users to feel badly about their actual appearance, but also may encourage users to consider how to modify their appearance offline (e.g., cosmetic enhancements and procedures). One of the few experimental studies to test the effects of selfie editing found that editing selfies increased women’s negative mood and facial dissatisfaction, regardless if they were primed with images of thin or average-sized women before editing their selfies (Tiggemann et al., 2020).

Two plausible explanations exist for why photo modifications might be related to body image concerns. First, research on objective self-awareness and objectification indicates that mere exposure to oneself should increase body consciousness. The act of modifying one’s photo provides a more intense or prolonged exposure to an image of oneself. From this perspective, additional exposure to one’s own image should increase negative thoughts about one’s appearance. Thus, the following is posited:

**H1:** Engaging in nonappearance photo modifications (vs. no modifications [control]) will lead to (a) less state appearance satisfaction and (b) more pro-cosmetic surgery attitudes.

A second possibility is that modifying one’s appearance not only provides additional exposure but also forces one to critically evaluate their perceived physical imperfections and flaws. For example, Rajanala and colleagues (2018) call attention to several concerns related to the production of selfies and how this social phenomenon has led to a rise in cosmetic procedures in recent years to enhance one’s appearance in line with edited selfies. Photo editing features available on popular social media platforms, such as Snapchat and Instagram, allow users to present themselves in unrealistic ways, thus “blurring the line of reality and fantasy.” People are increasingly seeking cosmetic surgery to appear more like these altered forms of themselves. Even though physical enhancements might appear consistent with perpetuated appearance ideals,
the reason one feels poorly about oneself might be explained by heightened self-consciousness or awareness of discrepancies between what one really looks like and what one projects online. Thus, the ability to modify one’s own appearance should heighten one’s self-awareness and cause women to scrutinize their appearance as they enhance their selfies.

H2: Engaging in appearance modifications (vs. nonappearance modifications) will lead to (a) less state appearance satisfaction and (b) more pro-cosmetic surgery attitudes.

1.3. Effects of Favorable Comments

The objectification literature further suggests that feedback on one’s appearance is a path toward self-objectification (e.g., Calogero et al., 2009; Gardner, 1980; Slater & Tiggemann, 2015; Tylka & Hill, 2004). However, there are several important differences between appearance commentary garnered face-to-face relative to on social media. Appearance commentary presented on social media is relatively persistent. Social media users can revisit comments received on their images over time. Relatedly, comments directed toward one’s appearance are broadcast to an audience of followers. Not only can other users view these comments, but they can also react to or endorse (e.g., “likes”) such commentary. Thus, appearance commentary is potentially more public, persistent, and impactful online. Indeed, research suggests that placing greater value in selfie feedback (i.e., selfie feedback investment) is associated with greater body surveillance and an increased drive for thinness (Butkowski et al., 2019).

The identity shift literature outlines factors that determine how users’ online behavior impacts their offline persona. Research suggests that the publicness of one’s online self-presentation (Gonzales & Hancock, 2008) and confirmatory feedback received on such self-presentations (Walther et al., 2011) drive one’s identity to shift in line with the projected online persona. Identity shift research typically focuses on the transfer of personality characteristics,
such as extroversion. What is less understood is the extent to which other characteristics portrayed online—specifically public displays of objectification in the form of selfies and associated appearance commentary—might impact users’ perceptions of themselves and their behavior (de Vries & Peter, 2013; Vandenbosch & Eggermont, 2012; Tiggemann & Barbato, 2018).

Public positive audience feedback on one’s online self-presentation should facilitate a shift in identity in line with the type of commentary. More specifically, appearance comments should increase self-objectification: One is rewarded based on their physical appearance. Thus, receiving certain types of positive feedback might intensify self-objectification and result in unintended negative consequences over time.

**H3:** Receiving favorable appearance comments on selfies will heighten state self-objectification compared to nonappearance comments.

As previously noted, the literature on self-presentation provides two plausible explanations for social behavior: (a) to please an audience, and (b) to construct one’s public self in a manner that is congruent with one’s ideal (Baumeister, 1982). Receiving favorable feedback on selfies might drive one’s willingness to share such content. Appearance comments might be interpreted as self-affirming (Gentile et al., 2012; Gonzales & Hancock, 2011; Toma & Hancock, 2013) and provide a temporary boost in feelings about one’s appearance. At the same time, tools that enable individuals to carefully craft images congruent with what one perceives are appearance ideals might also increase one’s propensity to share selfies. The extent to which positive feedback from an audience and photo modifications drive one’s intent to share selfies warrants further attention. The following research question is posed:
**RQ1:** To what extent does the type of photo modification and nature of positive comments contribute to one’s willingness to share selfies on social media in the future?

2. **Method**

A 3 x 2 between-subjects experiment was conducted to investigate the effects of the type of photo modification and nature of positive comments. Participants were randomly assigned to one of six experimental conditions varying the type of photo modification they engaged in (appearance modifications, nonappearance modifications, or no modifications [control]) and the nature of positive comments they received on their selfies (appearance comments vs. nonappearance comments).

2.1. **Participants**

The recruitment materials described this experiment as a two-part study with a lab session in which participants would evaluate photo tools on social media. A sample of 178 adult female participants was recruited from undergraduate courses at a large Midwestern university in the United States to participate in a two-part experimental study in exchange for course credit or financial compensation. Participants ranged from age 18 to 28 ($M = 19.81$, $SD = 1.44$) and identified as “White” (60%), “Asian/Asian American” (23.6%), “Black/African American” (6.7%), “Hispanic/Latina” (1%), “Multiracial” (2.2%) or “Other” (6.2%).

2.2. **Procedure**

2.2.1. **Online pre-test (part 1).** The first part of the study was completed at least 24 hours prior to the scheduled lab session via an online questionnaire. Once consent was obtained, participants responded to a series of demographic items and were provided detailed instructions to submit a selfie before their scheduled lab session. The instructions explained that a selfie is “a photo taken of oneself and by oneself.” Participants were required to use the reverse camera
feature on a smartphone to take and submit the selfie. Several specific criteria had to be met for inclusion in the study: (a) blank background (e.g., wall, doorway); (b) completely straight arm from the shoulder (i.e., no angling); (c) centered face; (d) clear, high resolution; and (e) unedited or digitally modified in any way (i.e., raw photo). Participants were told that their photo should be specifically taken for purposes of this study. Participants who failed to meet the inclusion criteria were asked to resubmit another image.

2.2.2. Lab session (part 2). The second part of the study involved a lab session where participants completed a series of tasks and questionnaires to measure their reactions. For participants in the photo modification conditions, they were directed to a private room with a desktop computer and an Apple iPad mini. The type of photo modification was manipulated through the photo-editing app the participant used and a set of instructions. A research assistant explained some basic features of the app, showed the participant how to use the app with an example, and provided a sheet that included a brief list of the app features.

In one condition (appearance modification condition), participants were assigned to use Facetune2, a photo-editing app that contains built-in features to modify your appearance (e.g., retouching tools for skin and complexion, resizing tools for facial features, photo filters). Participants were instructed to use the tools in the app to “enhance your appearance and physical attractiveness.” In the other condition (nonappearance modification condition), participants were assigned to use PicsArt, a photo-editing app that contains built-in features to modify the background of photos (e.g., stickers, text, borders, brushes, frames). Participants were instructed to use the tools in the app to “enhance the background or wall” and refrain from altering their physical appearance.
All participants were also told that their photo would be shared with another group of participants currently in another part of this study. Each participant was given 10 minutes to use the photo-editing app. See Figure 1 for the main menu screens. A research assistant then saved the photos and asked participants to complete a brief consumer product survey on the desktop computer evaluating the photo-editing app. The control group (no modification condition) did not modify their photos or complete this survey; this group skipped to the following step.

In a private room, a screenshot of their selfie with five favorable comments under their photo appeared on a desktop computer screen. Comments were pilot tested prior to the experimental study with 50 U.S. female adults recruited through Amazon Mechanical Turk who were compensated $1.00 in exchange for their participation. The pilot test ensured comments differed in their ratings of appearance focus and were similar in their ratings of positivity. All comments were derived from either actual Instagram posts or previous research on appearance commentary on social media (e.g., Fox & Wing, 2017). The research assistant explained that the purpose of this study is to understand how other people react to selfies. The research assistant told participants that their photo was briefly posted on a photo-sharing social media site resembling Instagram for another group of participants who were told to provide comments on their photo.

Half of the participants saw favorable comments that focused on their physical appearance and attractiveness (appearance comments condition); the other half saw favorable comments that focused on factors unrelated to their appearance (nonappearance comments condition). After viewing their comments, the research assistant directed them to complete a final set of post-test measures. Finally, participants were shown a debriefing form that explained the purpose of the experiment. See Figure 2 for comment templates.
2.3. Measures

2.3.1. Perceived photo modification. The extent to which participants felt they modified their photos was assessed with two Likert-style items (1 = strongly disagree; 7 = strongly agree). The items were, “I altered my photo from its original form,” and “I changed how my photo originally looked” (M = 4.23, SD = 2.38, α = .97).

2.3.2. Perceived appearance modification. The extent to which participants felt they modified their physical appearance in the photos was assessed with two Likert-style items (1 = strongly disagree; 7 = strongly agree). The items were, “I edited my physical appearance in the photo,” and “I used a photo-editing app to modify my physical appearance in my photo” (M = 2.97, SD = 2.32, α = .97).

2.3.3. State self-objectification. The extent to which participants thought about their own appearance after viewing the comments on their photo was assessed with 20 open-ended statements (referred to as the Twenty Statements Test; Fredrickson et al., 1998). Participants were asked to indicate how they feel about themselves and their identity by responding to statements that started with “I am __________.” Their responses were then coded into one of six categories: 1 = physical appearance (e.g., pretty, ugly, beautiful, fashionable, chubby, attractive, thin, cute, a brunette); 2 = demographic labels; 3 = roles; 4 = traits and interests; 5 = states; 6 = none of the above/unclear. Responses that were coded as physical appearance (1) were added together to produce a state self-objectification score for each participant.

Two research assistants coded the responses masked to the experimental conditions. Any discrepancies were resolved through discussion; inter-rater reliability was high (Cohen’s κ = .98). State self-objectification scores ranged from 0 to 16 (M = 3.65, SD = 3.02), with higher
scores indicating greater focus on physical appearance and thus a higher degree of self-objectification.

2.3.4. **State appearance satisfaction.** The extent to which the participants felt satisfied with their physical appearance in the moment was assessed with nine previously-validated, Likert-style items (1 = *strongly disagree*; 7 = *strongly agree*) by Cash and colleagues (2002). Sample items include: “I am physically attractive,” “I feel better about my looks than I usually feel,” and “I am pleased with my appearance” (*M* = 4.00, *SD* = 1.29, *α* = .91).

2.3.5. **Pro-cosmetic surgery attitudes.** The extent to which the participants expressed pro-cosmetic surgery attitudes was measured with 15 previously-validated, Likert-style items (1 = *strongly disagree*; 7 = *strongly agree*) from the Acceptance of Cosmetic Surgery Scale by Henderson-King and Henderson-King (2005). Sample items include: “It makes sense to have minor cosmetic surgery rather than spending years feeling bad about the way you look,” and “Cosmetic surgery is a good thing because it can help people feel better about themselves” (*M* = 3.78, *SD* = 1.26, *α* = .94).

2.3.6. **Willingness to distribute selfies.** The degree to which the participants might share a selfie similar to the one that they used in the study was measured with two items (1 = *strongly disagree*; 7 = *strongly agree*). The items were, “I would share selfies like the one I shared in the future,” and “I would consider posting selfies like the one I posted on social media” (*M* = 3.04, *SD* = 1.78, *α* = .92).

3. **Results**

Zero-order correlations, means, and standard deviations of key variables are reported in Table 1; Table 2 includes means and standard deviations for key variables by experimental condition, as well as reports significant mean differences across experimental conditions using
post-hoc Tukey HSD tests. To test our hypotheses, one-way analyses of variance (ANOVAs) were run to test the effects of the photo modification and comment manipulations independently. Then mediation analyses were used to further assess the effects of photo modification and positive comments on body image outcomes and intentions to share selfies in the future. Finally, two-way ANOVAs were conducted to explore any possible interactions between the photo modification and comment experimental factors.

3.1. Photo Modification

Two sets of ANOVAs were run to evaluate the success of the experimental inductions and gauge the extent to which participants thought they modified their photos. The first ANOVA assessed the extent to which participants felt they engaged in nonappearance photo modification. Participants who modified their background \((M = 5.47, SD = 1.47)\) felt they modified their photos significantly more than the control group who did not modify their photos \((M = 1.19, SD = 0.60)\), \(F(1, 115) = 409.40, p < .001, \eta^2 = .78\). The second ANOVA assessed participants’ perceptions that they modified their physical appearance in their photo. Participants in the appearance modification condition reported modifying their appearance \((M = 5.71, SD = 1.45)\) significantly more than those who in the nonappearance modification condition \((M = 1.97, SD = 1.31)\), \(F(1, 120) = 224.10, p < .001, \eta^2 = .65\).

3.1.1. Act of photo modification. Mediation analyses (PROCESS macro Model 4; Hayes, 2018) were used to explore the effects of engaging in nonappearance photo modifications, through perceived photo modification, on body image outcomes (H1). Conditions were dummy coded (no modification = 0; nonappearance modification = 1); each estimate is reported with its corresponding 95% bias-corrected bootstrap confidence interval based on 10,000 resamples.
For the first set of mediation analyses, we examined how the act of photo modification (IV) affected perceptions of photo modification (M) and, in turn, two outcome variables (DVs): state appearance satisfaction and pro-cosmetic surgery attitudes. For the outcome measure of state appearance satisfaction, participants in the nonappearance modification condition experienced less appearance satisfaction (DV) as they modified their selfies (M) relative to those who did not modify their photos (control group), point estimate = -1.15, 95% CI = [-2.09, -0.22], consistent with (H1a). For the outcome measure of pro-cosmetic surgery attitudes, participants in the nonappearance modification condition reported lower pro-cosmetic surgery attitudes (DV) as they modified their selfies (M) relative to those who did not modify their photos (control group), point estimate = -1.26, 95% CI = [-2.11, -0.37], counter to our prediction (H1b).

In sum, the results indicate significant indirect effects for engaging in nonappearance photo modifications (IV), through perceptions of photo modification (M), on state appearance satisfaction and pro-cosmetic surgery attitudes (DVs). No direct effects were detected. Post-hoc Monte Carlo power analyses for mediation models were used to determine if sufficient statistical power was achieved (Schoemann et al., 2017). These analyses indicated that our sample achieved adequate power (power = .74-.79) based on conventional power values (power = .80; Cohen, 1988).

3.1.2. Type of photo modification. Another set of mediation analyses were used to further explore the effects of the different types of photo modifications, through perceived appearance modification, on body image outcomes (H2). Conditions were dummy coded (nonappearance modification = 1; appearance modification = 2); each estimate is reported with its corresponding 95% bias-corrected bootstrap confidence interval based on 10,000 resamples.
For the second set of mediation analyses, we examined how the type of photo modification (IV) affected perceptions of appearance modification (M) and, in turn, two outcome variables (DV): state appearance satisfaction and pro-cosmetic surgery attitudes. For the outcome measure of state appearance satisfaction, nonappearance modification condition did not differ in their reported state appearance satisfaction (DV) as they modified their appearance (M) relative to appearance modification condition, point estimate = 0.19, 95% CI = [-0.36, 0.91]. H2a was not supported. For the outcome measure of pro-cosmetic surgery attitudes, nonappearance modification condition did not differ in their reported state appearance satisfaction (DV) as they modified their appearance (M) relative to appearance modification condition, point estimate = 0.26, 95% CI = [-0.27, 0.95]. H2b was also not supported. Thus, no indirect effects were detected, nor were direct effects found.

### 3.2. Favorable Comments

ANOVA were run to test the effect of the nature of positive comments on state self-objectification (H3). Consistent with H3, participants exhibited higher levels of state self-objectification when they received appearance comments ($M = 4.25, SD = 3.45$), compared to when they received nonappearance comments ($M = 3.02, SD = 2.36$), $F(1, 176) = 7.63, p = .006, \eta^2 = .04$.

We also posed the following research question (RQ1): To what extent does the type of photo modification and nature of positive comments contribute to one’s willingness to share selfies on social media in the future? No direct effects were found for the type of photo modification, $F(2, 175) = 1.60, p = .21$, nor the nature of comments, $F(1, 176) = 0.95, p = .33$.

### 3.3. Post-Hoc Analyses
Although no direct effects of photo modification or comments on willingness to share selfies were detected, the results indicate a significant indirect effect of the appearance comments, through state self-objectification (M), on willingness to distribute selfies on social media in the future (DV), point estimate = 0.18, 95% CI = [0.04, 0.37]. When participants received comments about their appearance, it heightened their state self-objectification, which, in turn, made them more inclined to post a selfie online in the future like the one they shared in our study.

We further examined the indirect effects of the appearance comments, through state self-objectification (M), on state appearance satisfaction (DV) and pro-cosmetic surgery attitudes (DV). Those who received appearance comments did not significantly differ in their reported state appearance satisfaction, point estimate = -0.001, 95% CI = [-0.09, 0.08], nor pro-cosmetic surgery attitudes, point estimate = 0.02, 95% CI = [-0.08, 0.11], as they self-objectified, relative to nonappearance comments. No direct nor indirect effects were detected.

Finally, two-way ANOVAs were conducted to explore any possible interactions between the type of photo modification and the nature of positive comments on outcomes of: state self-objectification, \(F(2, 172) = 1.19, p = .31\); state appearance satisfaction, \(F(2, 172) = 0.08, p = .92\); pro-cosmetic surgery attitudes, \(F(2, 172) = 0.35, p = .70\); and willingness to distribute selfies on social media in the future, \(F(2, 172) = 0.06, p = .94\). All interactions were not statistically significant; thus, no further analyses were conducted.

4. Discussion

The primary goal of this study was to investigate conditions under which selfies might be linked to more or less problematic body image consequences for women. In particular, we explored two social media features—photo modification and favorable comments—that might
lead to less satisfaction with one’s appearance, more interest in cosmetic procedures, and heightened self-objectification. The results indicate that merely engaging in photo modifications—such as decorating the background of a selfie—leads to less appearance satisfaction relative to not modifying one’s selfie at all, as anticipated. The results also indicate that nonappearance modifications lead to lower pro-cosmetic surgery attitudes, counter to our prediction. Interestingly, those who modified their appearance did not differ in their reported appearance satisfaction nor pro-cosmetic surgery attitudes relative to those who engaged in nonappearance modifications. Consistent with past objectification research on the effects of appearance commentary, receiving appearance comments on one’s selfie heightened state self-objectification relative to nonappearance comments; this effect was robust and did not vary by the type of photo modification. Further, the more women self-objectified after receiving appearance comments, the more inclined they were to share selfies like the one they shared in the study on social media in the future. These findings contribute to the literature on objectification and have important practical implications for women as they take and share selfies on social media.

4.1. Implications

Research guided by objectification theory (Fredrickson & Roberts, 1997) suggests that certain contexts, such as seeing one’s reflection in a mirror or being photographed (Plant & Ryan, 1985), may heighten state self-objectification. The reverse camera feature perhaps serves as another means to inspect one’s own body as a self-objectifying gaze. Objectification theory and objective self-awareness theory (Duval & Wicklund, 1972) indicate that mere exposure to oneself should increase body consciousness. This work sought out to test two plausible explanations for why photo modifications might be related to body image concerns: one that
suggests more intense or prolonged exposure to oneself should increase body image concerns; the other suggests modifications to one’s appearance should increase body image concerns to an even greater extent. Consistent with objectification and objective self-awareness theory, support was found for the former explanation: Mere exposure to one’s own image decreased state appearance satisfaction. The fact that prolonged exposure during the editing process caused women to feel badly about themselves is problematic given the prevalence of photo-sharing platforms, such as Instagram, that enable users to critique their images.

However, participants also experienced reduced pro-cosmetic surgery attitudes. That engaging in photo modifications of any kind might reduce cosmetic surgery attitudes is worth noting. Recent work suggests that people are increasingly seeking cosmetic procedures to look like altered forms of themselves (Rajanala et al., 2018). One possible explanation is that the opportunity to digitally modify one’s photo might lessen one’s desire to undergo major physical modifications offline in the short term. Photo-editing apps are becoming increasingly more sophisticated in their ability to enhance images with relative ease. Another possibility is the way in which the pro-cosmetic surgery items were framed. Henderson-King and Henderson-King’s (2005) Acceptance of Cosmetic Surgery Scale asks participants to rate their acceptance about cosmetic procedures in general with most items asking their opinions about others’ engagement in cosmetic procedures. That is, one could feel not only worse about one’s own appearance, but also be less likely to believe others should take advantage of cosmetic procedures to improve their appearance. Future work should explore the long-term effects of photo modifications and possibly account for the amount and types of modifications to provide more nuance in this domain.
The objectification literature also suggests that appearance commentary is one path toward self-objectification (e.g., Calogero et al., 2009). This study found support for this relationship: Receiving appearance comments on selfies heightened state self-objectification. It is important to note that appearance commentary experienced on social media sites, like Instagram, is oftentimes more persistent and visible to a broader audience than appearance commentary experienced in face-to-face encounters. This study extends research on appearance commentary to newer media platforms in several distinct ways. First, this research only focuses on variability in the nature of positive or favorable comments (appearance comments vs. nonappearance comments) and found significant differences in how the nature of comments affects state self-objectification. Second, this work establishes that receiving appearance comments might explain the appeal and widespread distribution of selfies online. The fact that women were more likely to consider sharing a selfie similar to the one they shared in the study on social media in the future is an interesting finding, especially since some women modified their appearance and others did not. The short-term effects of appearance comments driving one’s propensity to share selfies could be linked to more problematic consequences in the long term as one’s self-worth hinges on receiving favorable feedback based on physical appearance (Wang et al., 2019). Moreover, the effect of appearance comments was robust across photo modification conditions in which some people spent time and effort modifying their appearance, perhaps even to a greater extent than what can typically take place offline. The long-term effects of appearance comments on social media warrant further attention as self-objectification is linked to negative psychological consequences and severe mental health risks, such as depression and eating disorders (Fredrickson et al., 1998). Future work should consider the prolonged
effects of receiving positive appearance comments on social media and implement longitudinal research designs.

In terms of practical implications, photo-sharing social media sites are popular among young adult women. Indeed, the vast majority of our undergraduate student sample indicated they use Instagram (96.2%) for over an hour each day (57.9%). Our study provides some insight into what might be driving the production and distribution of selfies and their immense popularity on social media sites. Women who share selfies and receive favorable comments on their appearance are likely to focus on their appearance as a valued commodity. They are rewarded based on how they look to others which might influence their future behavior to share selfies online. Not only might female social media users share selfies and receive appearance comments, but they also may provide feedback on others’ selfies in the form of appearance comments (i.e., other-objectification). It is valuable to understand how appearance comments in the short-term impact female social media users. Future research may want to consider more observational approaches to better understand the long-term effects of audience feedback.

4.2. Limitations and Future Directions

Although this study takes an initial step into the effects of photo modification and positive comments on selfies, there are several limitations that should be addressed in future research. An important consideration is the type of selfie that was used in this study. Objectification research highlights gender differences in facial prominence; namely, the dichotomy of “face-ism” (Archer et al., 1983) versus “body-ism” (Crawford & Unger, 2004). Broadly, it is more common for depictions of men to focus on the face and women on the body. Two recent content analyses found that women’s selfies often conform to gender stereotypes or definitions of sexual objectification (e.g., sexually suggestive poses, body parts exposed, face
obscured or absent; Bell et al., 2018; Butkowski et al., 2019; Döring et al., 2016). However, this study strictly focused on face-focused selfies for two important reasons. First, asking participants to take a photo with the reverse camera feature on a smartphone enabled and a straight arm helped ensure greater experimental control over the type of imagery. It was critical that participants were able to engage in either appearance modifications or nonappearance modifications on the same image. Thus, a selfie taken with a relatively constant ratio of face to background allowed the focus to be on the experimental inductions. Second, asking participants to contribute a photo of their body or body-focused selfie would likely increase attrition rates. Even if participants were not habitual selfie-takers, it was important that participants felt comfortable completing the study tasks to recruit a more diverse undergraduate student sample and to reduce selection bias. We acknowledge that selfies can be captured for more than strictly appearance-focused content, such as documentation of important life events (Etgar & Amichai-Hamburger, 2017). Future work may wish to consider other types of selfies (e.g., mirror selfies) and underlying motivations for such production practices. Further, though objectification research has primarily focused on women in Western culture, future research should also consider gender and cultural differences for these photo practices.

4.3. Conclusion

In sum, the purpose of this research was to clarify and extend explanations provided by objectification theory for producing and receiving favorable feedback on one’s own images. Limited work has experimentally examined the production process (capturing and editing) and possible interactions with audience effects (receiving positive feedback). The results of this study inform our current understanding of the antecedents and consequences of state self-
objectification in a newer media context and take an initial step in identifying conditions under which selfies can be detrimental to women who edit their photos.
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Table 1

*Zero-Order Correlations, Means, and Standard Deviations*

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<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>M</th>
<th>SD</th>
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</thead>
<tbody>
<tr>
<td>1. Perceived photo modification</td>
<td>1</td>
<td>.56**</td>
<td>-.03</td>
<td>-.16*</td>
<td>-.15*</td>
<td>-.01</td>
<td>4.23</td>
<td>2.38</td>
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<tr>
<td>2. Perceived appearance modification</td>
<td>1</td>
<td>.01</td>
<td>.02</td>
<td>.04</td>
<td>.14</td>
<td>2.97</td>
<td>2.32</td>
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<tr>
<td>3. State self-objectification</td>
<td>1</td>
<td>-.03</td>
<td>.01</td>
<td>.22**</td>
<td>3.65</td>
<td>3.02</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. State appearance satisfaction</td>
<td>1</td>
<td>.68**</td>
<td>.19*</td>
<td></td>
<td>4.00</td>
<td>1.29</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Pro-cosmetic surgery attitudes</td>
<td>1</td>
<td>.11</td>
<td></td>
<td>3.78</td>
<td>1.26</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6. Willingness to distribute selfies</td>
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<td></td>
<td>3.04</td>
<td>1.78</td>
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</table>

*p < .05. **p < .01 (two-tailed).*
Table 2

Summary of Descriptive Statistics by Experimental Condition

<table>
<thead>
<tr>
<th>Variable</th>
<th>App Mod, App Comm (n = 33)</th>
<th>Nonapp Mod, App Comm (n = 31)</th>
<th>No Mod, App Comm (n = 27)</th>
<th>App Mod, Nonapp Comm (n = 28)</th>
<th>Nonapp Mod, Nonapp Comm (n = 30)</th>
<th>No Mod, Nonapp Comm (n = 29)</th>
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<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
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<tr>
<td>Perceived photo modification</td>
<td>6.17</td>
<td>0.99</td>
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<td>1.13</td>
<td>1.17</td>
<td>0.54</td>
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<td>Perceived appearance modification</td>
<td>5.91</td>
<td>1.41</td>
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<td>1.15</td>
<td>0.46</td>
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<td>State self-objectification</td>
<td>4.58</td>
<td>3.24</td>
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<td>4.48</td>
<td>3.06</td>
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<td>State appearance satisfaction</td>
<td>3.89</td>
<td>1.38</td>
<td>3.63</td>
<td>1.41</td>
<td>3.91</td>
<td>1.17</td>
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<td>Pro-cosmetic surgery attitudes</td>
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<td>3.49</td>
<td>1.35</td>
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<tr>
<td>Willingness to distribute selfies</td>
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<td>2.01</td>
<td>2.77</td>
<td>1.74</td>
<td>2.74</td>
<td>1.33</td>
</tr>
</tbody>
</table>

*Note.* State self-objectification scores could range from 0-20. All others were measured on 1-7 Likert-style scales. App Mod = appearance modifications; Nonapp Mod = nonappearance modifications; No Mod = no modifications; App Comm = appearance comments; Nonapp Comm = nonappearance comments. Subscripts letters indicate significant mean differences (*p* < .05) across experimental conditions using post-hoc Tukey HSD tests.
Author Contributions Statement (CRediT)

Megan A. Vendemia: Conceptualization; Methodology; Formal Analysis; Investigation; Resources; Data Curation; Writing – Original Draft; Writing – Review & Editing; Supervision; Project Administration

David C. DeAndrea: Conceptualization; Methodology; Writing – Original Draft; Writing – Review & Editing

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PHOTO MODIFICATIONS AND COMMENTS ON SELFIES

Figure 1

Facetune2 (Appearance Modification Condition) and PicsArt (Nonappearance Modification Condition) Main Menu Screens
PHOTO MODIFICATIONS AND COMMENTS ON SELFIES

Figure 2

Templates for Appearance and Nonappearance Comments

- Beautiful
- very attractive
- So sexy!
- Hot

- I really like this shot
- You are a natural at this
- very creative and artistic
- u have great taste
- I like the color of your top