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Picture Perfect: The Direct Effect of Manipulated Instagram Photos on Body Image in Adolescent Girls

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ABSTRACT

This study investigates the effect of manipulated Instagram photos on adolescent girls' body image, and whether social comparison tendency moderates this relation. A between-subject experiment was conducted in which 144 girls (14–18 years old) were randomly exposed to either original or manipulated (retouched and reshaped) Instagram selfies. Results showed that exposure to manipulated Instagram photos directly led to lower body image. Especially, girls with higher social comparison tendencies were negatively affected by exposure to the manipulated photos. Interestingly, the manipulated photos were rated more positively than the original photos. Although the use of filters and effects was detected, reshaping of the bodies was not noticed very well. Girls in both conditions reported to find the pictures realistic. Results of this study implied that the recent societal concern about the effects of manipulated photos in social media might be justified, especially for adolescent girls with a higher social comparison tendency.

Instagram is currently a very popular social network site, especially among teenagers (Seetharaman, 2015). Instagram allows its users to share photos and videos with others. Since its start in 2010, it has attracted more than 400 million active users, who upload around 80 million photos a day (Instagram, 2015). Photos and videos are a very direct form of online self-presentation and have become an increasingly powerful form of social online currency (Rainie, Brenner, & Purcell, 2012). Even though Instagram is the most popular photo sharing application on the Internet, it has received very little academic attention (Hu, Manikonda, & Kambhampati, 2014). This is surprising as Instagram has lately been a topic of concern in the public debate (Sass, 2014; Winter, 2013). The main concern involves the possibility to manipulate Instagram photos by using retouching techniques and, consequently, the potentially negative influence that these “perfect pictures” may have on body image of (young) Instagram users. In particular, both critics and fans frequently blame celebrities and models for using photo

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enhancement and retouching techniques. Hence, they normalize an unrealistic body ideal, which is problematic as they serve as role models for girls and young women (Sullivan, 2014).

Although in general, famous people have been criticized for manipulating self-images on social media, there are important reasons to investigate the effects of edited pictures of “ordinary” Instagram users. Research has indicated that men and women, both adolescents and adults, compare themselves more often to peers than to models or celebrities for social attributes (i.e., personality, intelligence) and physical attributes (i.e., weight, height, body image; Jones, 2001; Strahan, Wilson, Cressman, & Buote, 2006), and has thereby supported the general expectation from the social comparison literature that individuals generally prefer to make social comparisons to similar others (Miller, Turnbull, & McFarland, 1988). Furthermore, the comparison with peers might affect their body image in a comparable manner as media images do (Myers & Crowther, 2009). This might be due to the fact that peers are perceived more similar to themselves than celebrities and therefore are more relevant to compare themselves with. This is in line with the extensive identification literature, combining social cognitive theory (Bandura, 2002), the message-interpretation process model (Austin & Meili, 1994), and exemplification theory (Zillmann & Brosius, 2000). Shortly summarized, these theories state that when people perceive others to be more similar to themselves, identification and related cognitive and behavioral consequences are more likely to occur (see also Andsager, Bemker, Choi, & Torwel, 2006). This social influence mechanism might just as well apply to social media networks, as these are very popular environments for peer interaction. Research revealed that users of social media platforms often manipulate their appearance in the pictures they post online, and that this habit is especially prevalent among young girls (Manago, Graham, Greenfield, & Salimkhan, 2008; Philly Renfrew Center Foundation, 2014). However, the effects of exposure to enhanced social media photos of peers on young girls’ body image are still largely unknown. Adolescent girls are often found to be particularly vulnerable for being influenced by media images (e.g., Borzekowski, Robinson, & Killen, 2000) because of the psychosocial development that is characteristic for this phase (Sturdevant & Spear, 2002). The present study attempts to further elucidate this relation by investigating the effects of exposure to original and manipulated Instagram photos of peers on adolescent girls’ body image.

Earlier research focusing on body image has primarily investigated the influence of exposure to idealized thin bodies in advertisements, magazines, television, as well as music videos on young women’s body image. These studies often revealed a relation between exposure to the thin ideal and a negative body image among young girls and women (e.g., Grabe, Ward, & Hyde, 2008; Halliwell & Dittmar, 2004; Irving, 1990;). This effect can be explained by the negative contrast theory, stating that women experience a contrast between themselves and the thin, idealized models and that this

leads to lower body satisfaction (Thornton & Maurice, 1999; Thornton & Moore, 1993). However, some studies actually found self-enhancing effects of exposure to thin ideal images (e.g., Henderson-King & Henderson-King, 1997; Joshi, Herman, & Polivy, 2004; Mills, Polivy & Tiggemann, 2002; Myers & Biocca, 1992). Based on these findings, an alternative to the negative contrast theory was formulated by Mills et al. (2002), suggesting that thin media models might cause a “thinness fantasy” (Myers & Biocca, 1992) by inspiring women for whom thinness is self-relevant. Ample research has studied the effects of media models on body image, but the effects of exposure to images on social media sites are not well established. As traditional media are surpassed in popularity by online social media platforms, especially among young people, it becomes important to include these newer forms of media in this line of research as well (Fardouly & Vartanian, 2015; Seetharaman, 2015; Tiggemann & Slater, 2013).

One important characteristic that sets social media apart from other studied media types is the strong focus on peer interactions. Media models, that is, models and celebrities, are often presented as unrealistic standards of beauty in for example media literacy programs and the public debate, because of the well-known editing and retouching techniques used when displaying media models (e.g., Thompson & Heinberg, 1999; Yamamiya, Cash, Melnyk, Posavac, & Posavac, 2005). Less known is that “ordinary” social media users also use these techniques, as a part of impression management in self-presentation (Manago et al., 2008; Won Kim & Chock, 2015). Girls who compare themselves with manipulated photos of peers might think they are comparing themselves with people who are similar to them, rather than with celebrities whose bodies are seen as unattainable (Jones, 2001). However, one might conclude that the appearances of these peers might be not realistic at all. The current study investigates whether manipulated—and thereby idealized—Instagram photos of peers affect body image in young women. In line with earlier studies on exposure to idealized images, it is expected that:

H1: Exposure to manipulated Instagram photos leads to lower body satisfaction in adolescent girls than exposure to original photos.

Previous research also revealed that the effects of exposure to the thin ideal in traditional media depend on individual susceptibility factors (e.g., Henderson-King & Henderson-King, 1997; Joshi et al., 2004; Myers & Biocca, 1992; Wilcox & Laird, 2000). Especially the tendency to engage in social comparisons (Social Comparison Theory; Festinger, 1954) has proven to be influential in the relation between exposure to the thin ideal in the media and women’s body dissatisfaction (e.g., Keery, Van den Berg, & Thompson, 2004; Won Kim & Chock, 2015).

It is often found that body dissatisfaction is a result of young women's upward social comparisons of their own appearance with the appearance of other young women in real life or in a (social) media context (e.g., Dittmar & Howard, 2004; Fardouly, Diedrichs, Vartanian, Halliwell, 2015; Fardouly & Vartanian, 2015; Mabe, Forney, & Keel, 2014; Tiggemann & Miller, 2010; Tiggemann & Slater, 2013; Vartanian & Dey, 2013). More precisely, women who more frequently engage in comparisons with others are also more negatively affected by exposure to idealized images of others, compared to women who engage in these comparisons less frequently (Dittmar & Howard, 2004). Therefore, the current study examines whether women's social comparison tendency moderates their responses to manipulated Instagram photos. It is expected that:

H2: The negative effect of exposure to manipulated Instagram photos compared to original Instagram photos on body satisfaction is stronger for girls with higher social comparison tendency.

Method

An online experiment was conducted to investigate the effect of manipulated Instagram photos on the body image of girls. The experiment has a 2 (Instagram photos: original versus manipulated) \times 2 (social comparison tendency: lower vs. higher) between-subjects design. Participants were randomly exposed to either 10 original Instagram photos ($N = 72$) or to 10 manipulated photos ($N = 72$). Subsequently, they answered a number of questions through an online survey.

Participants and procedure

A total number of 144 adolescent girls participated in the experiment. Their age ranged between 14 and 18 years old ($M = 15.92$; $SD = 1.16$). The girls in our sample attended different levels of secondary education. In The Netherlands—where this study was conducted—children are divided over different educational levels at secondary schools based on their achievement scores obtained at elementary schools (cf. Scheerens, Luyten, & Van Ravens, 2011). Students can either attend pre-vocational secondary education (the lowest level, preparing for vocational education), general secondary education (middle level, preparing students for universities of applied sciences), or pre-university education (highest level, preparing student for research universities). As the transition from elementary to secondary school usually takes place at the age of 12, the girls in our sample attended at least of few years of secondary education at a specific level of secondary

education. This makes it important to take level of education into account. The girls in our sample were almost equally divided over the three levels of education that could be discerned: 49 girls attended a low level of education, 50 girls had a medium level of education, and 45 girls attended the highest level of education. The division of age over the different levels of education was somewhat skewed: The lower educated participants were somewhat younger ($M = 15.18$; $SD = .81$) than participants attending the middle ($M = 16.22$; $SD = .93$) or highest level ($M = 16.40$; $SD = 1.32$) of education. This can be explained by the fact that education at the lowest level takes 4 years to complete, whereas education at the middle (5 years) and highest level (6 years) takes longer. Therefore, students at the latter two levels can be older when attending secondary education. Preliminary analyses, however, showed that the small differences in the division of age over the three levels of education did not play a role of interest in the analyses.

Snowball sampling was used to recruit participants. We first invited girls from our own network to participate. Next, we asked them whether they knew other girls aged between 14 and 18 years old that might want to participate. Because most of the participants were under the age of 18, active parental consent was always asked for prior to the start of the data collection. This procedure is in accordance with the guidelines as formulated by the ethics committee of Faculty of Social Sciences (ECSS) at Radboud University. After obtaining permission from parents, girls received an email containing further information about the study and a link to the online experiment.

In the invitation email, a cover story was used to inform them about the research, as it was important not to reveal the real aim of the study. Participants were told that the study goal was to investigate how contextual factors affect preferences for different face types, and that they therefore would be exposed to pictures of people with different facial expressions. The email also contained instructions about the procedure they had to follow while taking part in the study. We asked them to complete the task at a moment that they were in a quiet area, without disturbing factors in their surroundings. In addition, they were asked to focus on the experiment only and to avoid interruptions.

After clicking on the link to start the experiment, a short instruction was presented on the screen. We repeated the (false) study aim and told them that the study started with showing them 10 Instagram photos, either original or manipulated. We asked each participant to take enough time to carefully look at the photos, and informed them that subsequently a number of questions would be asked. We emphasized that all information provided would be treated confidentially. After completing the study, participants were thanked for their voluntary participation. Moreover, they were offered the possibility to contact the researchers through email in case they wanted to have more information or to ask additional questions about the study.

Materials

The stimulus materials consisted of 10 “selfies” (self-portrait photos taken with a digital camera or camera phone held in the hand; Saltz, 2014). Selfies were used because photos in this format are a popular trend on Instagram and other social network sites (Hu et al., 2014). A teenage girl was the only person present in the picture. Social comparison requires similarity between the observer and the persons that is observed (Suls, Martin, & Wheeler, 2002), implying that the girls participating in the study are more likely to compare themselves with females having a comparable age. In Dutch society, the majority of the population is native Dutch and predominantly has a light skin color and Caucasian ethnicity (Centraal Bureau voor de Statistiek, 2015). We, therefore, only used sample images from women with a light skin color. The selected photos may therefore increase the change of social comparison, which is important in light of the study aim. Inspired by Fardouly et al. (2015), another criterion that was applied to the selection of stimulus materials was that photos varied in the parts of the body that were emphasized. Five photos particularly emphasized the girl’s face, skin, and hair; the other five highlighted the whole body (see examples in Figure 1).

To create the manipulated photos, each original photo was edited. To this end, effects and filters that are available on Instagram were used. Instagram provides a high number of options to improve pictures. Possibilities include, but are not limited to, improving the color intensity, brightness, and adding strong shadow. Moreover, according to frequently used altering techniques (Philly Renfrew Center Foundation, 2014), we edited the faces and bodies visible in the photos, by removing eye bags, wrinkles, and impurities, and by reshaping legs to be thinner and waist to be slimmer. Finally, all photos were displayed in the same Instagram format. However, we removed comments

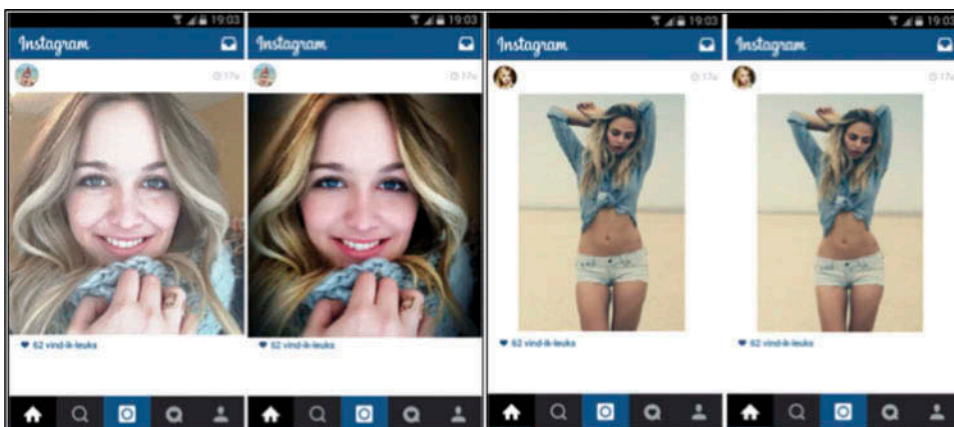


Figure 1. Examples of original versus manipulated Instagram photos emphasizing face, skin, and hair (left), or body (right).

that are normally presented along with photos on Instagram, and gave all materials the same number of likes to exclude this factor as a possible confounder.

Measures

Body image was the dependent variable in the study. The Body Image State Scale (Cash, Fleming, Alindogan, Steadman, & Whitehead, 2002) was used to measure girls' evaluation and affect about their physical appearance at this moment. Girls indicated their (dis)satisfaction with their overall physical appearance; (dis)satisfaction with their body size and shape; (dis)satisfaction with their own weight; feelings of physical (un)attractiveness; current feelings about their own looks relative to how one usually feels; and their evaluation of their appearance relative to how the average person looks. Following Cash et al. (2002), a 9-point, bipolar, Likert-type scale was used with a higher score indicating a more positive body image. As expected, results of a factor analysis including the six items yielded one factor. The initial eigenvalue of this factor (3.341) indicated that this factor explained 55.69% of the variance (factor loadings $>.47$). In addition, Cronbach's alpha was sufficient ($\alpha = .83$). We, therefore, calculated the participant's mean score on the statements to construct the variable body image ($M = 4.68$; $SD = 1.26$).

To measure girls' *social comparison tendency*, the Iowa–Netherlands Comparison Orientation Measure (Gibbons & Buunk, 1999) was used. This scale consists of 11 items, measured with a 5-point Likert scale ranging from (1) *totally disagree* to (5) *totally agree*. These 11 items were:

- (1) I often compare myself with others with respect to what I have accomplished in life;
- (2) If I want to learn more about something, I try to find out what others think about it;
- (3) I always pay a lot of attention to how I do things compared with how others do things;
- (4) I often compare how my loved ones (boy or girlfriend, family members, etc.) are doing with how others are doing;
- (5) I always like to know what others in a similar situation would do;
- (6) I am not the type of person who compares often with others;
- (7) If I want to find out how well I have done something, I compare what I have done with how others have done;
- (8) I often try to find out what others think who face similar problems as I face;
- (9) I often like to talk with others about mutual opinions and experiences;

- (10) I never consider my situation in life relative to that of other people; and
- (11) I often compare how I am doing socially (e.g., social skills, popularity) with other people.

The scores on item 6 and item 10 were reversed prior to the analyses. Results of a factor analysis yielded two dimensions. However, the second dimension consisted of only one statement: I often like to talk with others about mutual opinions and experiences. We decided to exclude this item and, thus, to construct the variable based on the remaining ten items ($\alpha = .87$). Additionally, we created two groups (lower vs. higher tendency) by using a mean split ($M = 3.22$; $SD = .90$) to make this variable suitable for the analysis. As a result, 63 girls were indicated as having a lower tendency to make social comparisons, the other 81 girls as having a higher tendency to compare themselves with others.

Level of education is included as control variable in the analysis, as a correlation was found between educational level and the dependent variable ($r = .388$; $p < .001$). Those with a higher level of education generally had a more positive body image.

Results

Manipulation checks

For the manipulation check, we asked the 144 girls that participated in the study to respond on a scale ranging from (1) *totally disagree* to (5) *totally agree* to several statements about the photos. First, we asked them to what extent they agreed with the statement that the Instagram photos were manipulated by using filters. Results of a t test showed that their agreement with this statement was higher for the manipulated photos ($M = 4.51$; $SD = .77$) than for the original photos ($M = 2.19$; $SD = 1.21$), $t(142) = -13.759$; $p < .001$. In addition, girls gave higher agreement to the statement that effects (e.g., adding color to look less pale, improving brightness) were used for the manipulated ($M = 4.44$; $SD = .82$) than for the original photos ($M = 2.11$; $SD = 1.15$), $t(142) = -14.055$; $p < .001$. This implies that we were successful in making a distinction between the original and the manipulated photos in this regard. We also asked the participants whether the faces and bodies in the photos were manipulated in terms of reshaping. t tests showed that it was harder to detect these adaptations in the manipulated photos, as the differences compared to the original photos were only marginally significant. For faces, manipulated photos scored somewhat higher ($M = 1.82$; $SD = .81$) than the original photos ($M = 1.61$; $SD = .70$), $t(142) = -1.674$; $p = .051$. In addition, participants slightly more agreed with the statement that bodies were reshaped for the manipulated ($M = 1.76$; $SD = .83$) than for the original $M = 1.60$; $SD = .64$) photos, $t(142) = -1.347$; $p = .090$.

Descriptive Results

Prior to reporting the results of the hypotheses testing, we provide some general information about the girls' evaluation of the photos. First, results of a t test showed that girls in the manipulated photos condition rated the photos as more pretty on a 5-point Likert scale ($M = 4.25$; $SD = .69$) than girls in the original photos condition ($M = 3.75$; $SD = .62$), $t(142) = -4.577$; $p < .001$. In addition, the manipulated Instagram photos were perceived as more attractive ($M = 4.57$; $SD = 1.69$) than the original photos ($M = 3.38$; $SD = .67$), $t(142) = -7.533$; $p < .001$. We also found that girls are generally unaware that Instagram photos might be manipulated. To be more specific, for both original and manipulated photos, they agree with the statement that the photos provide a representative view of reality ($M_{\text{original}} = 3.68$; $SD_{\text{original}} = 1.11$ vs. $M_{\text{manipulated}} = 3.72$; $SD_{\text{manipulated}} = 1.20$ on a 5-point Likert scale ranging from (1) *totally disagree* to (5) *totally agree*), $t(142) = -.216$; $p = .829$. In addition, no differences were found regarding the statement that the photos paint a picture that is better than reality, $t(142) = -.718$; $p = .474$. The means for both original ($M = 2.22$; $SD = .109$) and manipulated photos ($M = 2.36$; $SD = 1.23$) showed that they generally disagree with this statement.

Effects of manipulated instagram photos

To test the hypotheses, a one-way analysis of covariance was performed with body image as dependent variable, Instagram photo manipulation and tendency to make social comparisons as between-subjects factors, and level of education as covariate. Participant age was excluded as additional covariate because preliminary analyses showed no effects of age on the dependent variable body image. Hypotheses were tested at the $\alpha = .05$ level (one-tailed).

The first hypothesis predicted that girls would have lower body satisfaction after exposure to manipulated Instagram photos than original photos. This hypothesis was supported, $F(1,139) = 4.252$; $p = .021$; $r = .17$. Girls exposed to the manipulated photos showed to have a significant lower body satisfaction ($M = 4.57$; $SE = .13$) compared to girls exposed to the original photos ($M = 4.94$; $SE = .13$). Results additionally showed that level of education (included as control variable) significantly affected body image, $F(1,139) = 14.618$; $p < .001$; $r = .31$. Descriptive statistics showed that a higher the level of education correlates with a more positive body image.

The second hypothesis concerned the moderating effect of the tendency to make social comparisons. First, a main effect of social comparison tendency on body image was found, $F(1,139) = 18.828$; $p < .001$; $r = .35$. Girls who have a higher tendency to compare themselves with others have a lower body

image ($M = 4.35$; $SE = .12$) compared to those who have a lower social comparison tendency ($M = 5.15$; $SE = .14$). In addition, results provided support for the expectation that the negative effect of manipulated Instagram photos on body image exposure are stronger for girls with a higher social comparison tendency, $F(1,139) = 3.890$; $p = .025$; $r = .16$.

As shown in Figure 2, post-hoc F tests (pair-wise comparisons with Bonferroni correction of the interaction categories) indicate that the body image of girls with a higher tendency to make social comparisons is more negatively affected by manipulated Instagram photos ($M = 3.98$; $SE = .17$) than by original photos ($M = 4.72$; $SE = .18$), $F(1,139) = 9.209$; $p = .002$; $r = .25$. In contrast, girls with a lower tendency to make social comparisons did not significantly differ in body image after exposure to either manipulated ($M = 5.16$; $SE = .18$) or original photos ($M = 5.15$; $SE = .21$), $F(1,139) = .001$; $p = .485$; $r = .00$. Moreover, results revealed that the negative effect of manipulated photos is more prevalent among girls with a higher tendency to make social comparisons, $F(1,139) = 18.777$; $p < .001$; $r = .34$. Original photos also affected the body image of these girls more compared to ones with a lower tendency to make social comparisons, but this influence is weaker, $F(1,139) = 3.016$; $p = .043$; $r = .15$. In all, the effect of manipulated Instagram

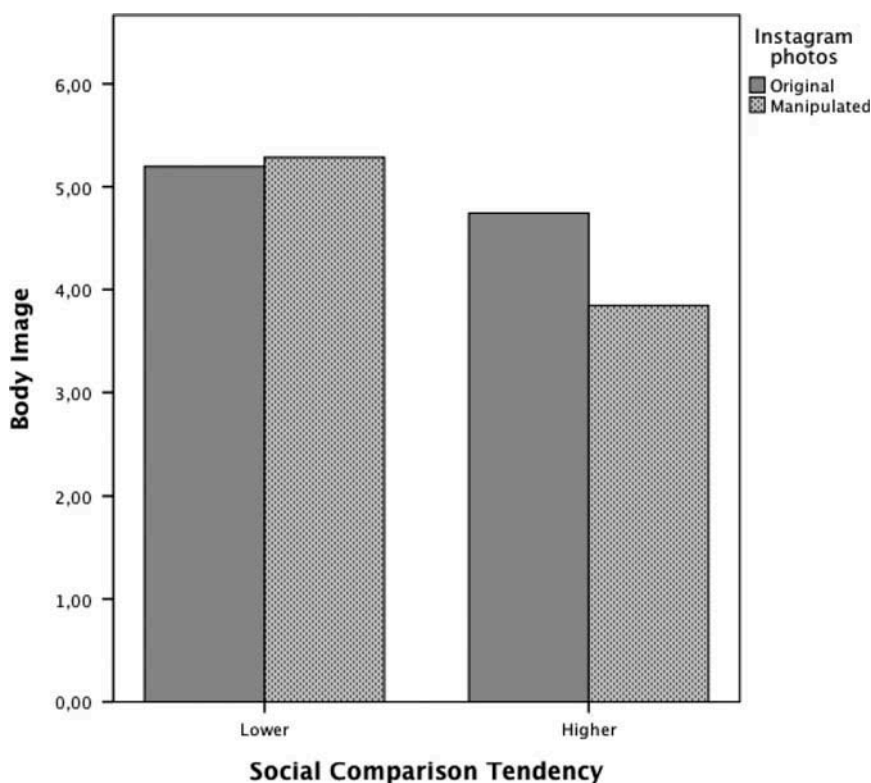


Figure 2. Effect of manipulated versus original Instagram photos on body image among girls with a lower and higher social comparison tendency.

photos on body image exposure is stronger for girls with higher social comparison tendencies.

Discussion

The current study set out to investigate whether manipulated Instagram photos have a negative effect on the body image of female adolescents and whether those with a higher tendency towards social comparison are more vulnerable in this regard. It can be concluded from the results that exposure to manipulated Instagram photos indeed leads to lower body satisfaction in comparison to exposure to non-manipulated selfies from online peers. This particularly related to girls with a higher tendency to make social comparisons. The body image of girls with a lower tendency to compare themselves with others was about equal after exposure to either original or manipulated Instagram photos. In contrast, girls with a higher tendency to make social comparisons had a lower body image in general, and especially after exposure to the manipulated Instagram photos.

These results imply that the common practice of Instagram users to manipulate and tweak their appearance in pictures can have negative consequences, at least for the girls who are prone to make social comparisons. It is worrisome that even short exposure to unfamiliar peers in a research setting can lead to direct changes in body image. The fact that girls believed that the presented Instagram photos showed a representative view of reality and did not notice reshaping of the bodies very well reinforces these concerns. Adolescence is a critical period for psychosocial development and earlier research showed that girls in this phase are more vulnerable for media influences because they equate their own bodies with media images (e.g., Borzekowski et al., 2000). The frequent use of social media networks such as Instagram among young girls (Seetharaman, 2015) clearly stresses the importance of studying the effects of exposure. These results might imply recommending including a disclosure when opening an Instagram account that would remind users that the images on Instagram are often retouched and manipulated, as a means of visual literacy and thereby possible protection from harmful effects. However, following the results of the study by Harrison and Hefner (2014), who reported harmful effects (i.e. lower physical self-esteem and higher body consciousness) of these so called retouched-aware photos, this recommendation might lead to undesirable effects. Therefore, more research is needed to unravel how to best protect these young girls from the negative effects of retouched (social) media images.

The findings of the current study are in line with results found in studies on the effects of exposure to idealized thin bodies in traditional media as well as the first studies on social media networks (i.e. Fardouly et al., 2015; Fardouly & Vartanian, 2015). These studies showed that exposure to

idealized media images lead to a greater focus on the body and more uncertainty among females (Hargreaves & Tiggeman, 2004, Thompson & Heinberg, 1999), which consequently may lead to higher body dissatisfaction (Knauss, Paxton, & Alsaker, 2008). An important difference, however, is that the girls in the current study compared themselves with similar young women (unfamiliar peers), and not with models or celebrities showing the well-known unrealistic beauty standards. In line with earlier findings, the effects of social comparisons may be stronger when perceived similarity is high, which might be the case with exposure to images of peers in social media (see also Andsager et al., 2006; Montoya, Horton, & Kirchner, 2008). Fardouly and colleagues (2015) also argue that the appearance of peers in social media environments is seen as more attainable and, therefore, and more directly triggers social comparison. A suggestion for future research would be to include measures of perceived similarity and attainability to examine this assumption.

Limitations of the current study may also help to shape the future research agenda. First, the current study investigated a short-term effect of exposure to Instagram photos. Therefore, it remains unclear whether this effect will also exist in the longer term. As girls and young women are frequently exposed to Instagram photos (cf. Instagram, 2015), the effect might be even stronger in the long run. Future research should provide more insight into the long-term effects of exposure to Instagram photos on the body image of girls. This research should also strive to assess the general social media habits of the girls involved, to validate if market research positioning of Instagram as the preferred type of social media for girls this age is accurate (Piper Jaffray, 2014; Turpijn, Kneefel, & van der Veer, 2015). In addition, it would be interesting to focus on the effect of Instagram photos presenting people that participants know personally, instead of (only) exposing them to people they are not familiar with. Girls using Instagram are also frequently exposed to photographs of people from their own network, such as friends, classmates, and peers (Madden et al., 2013). One might argue that it is more likely that girls realize that photos are manipulated when they are exposed to photos of people they know, as it is easier to notice that the person in Instagram photos look different than in reality. As a consequence, it is possible that the manipulated photos have a less negative effect on the body image of girls. However, it is also possible that girls have a higher tendency to compare themselves with people from their personal network compared to people they do not know, because of higher perceived similarity and social relevance.

Related to this, our results showed that girls were—at least to some extent—unable to truly detect the retouching of the bodies of the pictures. Although this is in accordance with “real” media pictures (e.g., in magazines) in which retouching is used, this might still be a limitation of our

study because we cannot totally rule out the possibility that our manipulation was too subtle to detect and the effects are solely explained by other factors (e.g., the filters used). However, we considered the manipulation substantial enough to be a valid reflection of reality and the fact that we found differences in body satisfaction shows that although the manipulation might not be truly explicitly perceived, it still can affect the viewer. Following up on this issue, an interesting discussion in this light is how reality is exactly defined. Edited and retouched photos might have become so widely accepted and, therefore, normal for contemporary teenagers (e.g., Choi, 2016; Sutton, Brind & McKenzie, 2007; Wheeler, 2005), that it is hard to tell whether these pictures actually deviate from their view of reality as an issue separate from whether the retouching is detected or not. Related to the recent development that not only celebrities and models, but also peers and teens themselves can idealize their images through retouching, it might even be the case that the distinction between these groups (celebrities vs. peers) in terms of identification and comparison becomes much less profound as the differences between the images become smaller. To investigate this hypothesis, future studies could focus on further examining the changing roles of celebrities versus peers as targets of (appearance-related) comparisons.

Furthermore, the participants were told that the study goal was to investigate how contextual factors affect preferences for different face types, and that they, therefore, would be exposed to pictures of people with different facial expressions. Although we believe that our cover story distracted the participants from (guessing) the real purpose of the study, we are aware of the fact that demand still might have played a role, as exposure to the pictures was followed by the social comparison and body image questions. Demand has been studied in this line of research and some evidence suggests that participants tend to engage in upward comparisons when the study purpose is more obvious rather than less (Mills et al., 2002). It is possible that upward comparisons were stimulated in the present study by asking questions about making comparisons after exposure, although demand characteristics were not explicitly present like in the experiment by Mills et al. (2002). Still, it is very important to pay attention to this topic and to try to avoid demand characteristics as much as possible in future studies. It would also be helpful to ask the participants at the end of the study what they consider the goal of the study, to investigate to what extent they are aware of the purpose. In addition, future studies should include a control condition in which participants are exposed to neutral pictures (e.g., showing landscapes) or not exposed to pictures at all (cf. Harrison & Hefner, 2014), to establish baseline scores on body image in the sample. These baseline scores can serve as a true reference point, since exposure to selfies (edited or not) in itself can affect body image.

Another suggestion for future research would be to include a measure that specifically investigates appearance-related comparison tendencies, for example the Physical Appearance Comparison Scale-Revised (PACS-R, Schaefer & Thompson, 2014). In the current study, we focused on general social comparison tendencies, but we know from the literature that social comparison can manifest itself in many different target domains (Wood, 1989) of which appearance is one that might be particularly interesting in the light of the present study. Using an appearance-related comparison measure might result in even stronger moderating effects than general comparison tendencies, as scoring high on this specific domain of social comparison suggests that girls might have a higher risk of being influenced by social media photos picturing ideal bodies as they specifically compare themselves with others with respect to appearances (e.g., Myers & Crowther, 2009). A final recommendation for future research would be to include ethnicity of the participants as a possible moderator and also include a larger variety of ethnicities in the stimulus material. It is important to include ethnicity in future research because research has shown that both weight-related and general appearance body image varies among ethnic groups (cf. Altabe, 1998; Cachelin, Rebeck, Chung, & Pelayo, 2002; Miller et al., 2000).

In sum, this study contributes to the existing literature regarding media influence on body image in adolescent girls by examining the effects of exposure to Instagram photos of peers. Photo and video sharing becomes more and more common among (young) social network users, so it is important to establish its effects. In addition, the results of the present study add to the public discussion about the use of retouching and reshaping techniques in social media self-presentation materials. The findings indicate that not only celebrities exert influence because they serve as role models, but we should also seriously consider the influence of (unfamiliar) peers.

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