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Chang, Leanne; Li, Pengxiang; Loh, Renae Sze Ming; Chua, Trudy Hui Hui

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**A Study of Singapore Adolescent Girls' Selfie Practices, Peer Appearance Comparisons,
and Body Esteem on Instagram**

Leanne Chang, PhD

Department of Communication Studies

Hong Kong Baptist University

leannechang@hkbu.edu.hk

Pengxiang Li

Department of Communications and New Media

National University of Singapore

lipengxiang@u.nus.edu

Renaë Sze Ming Loh

Department of Sociology

Utrecht University, Netherlands

s.m.loh@uu.nl

Trudy Hui Hui Chua

Department of Music Therapy

The University of Melbourne, Australia

trudyc@student.unimelb.edu.au

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Abstract

Social media allow users to play multiple roles as receivers, exhibitors, and evaluators of idealized images through photo browsing, posting, and editing. In this study, we examined the associations between adolescent girls' various types of Instagram selfie practices and their body esteem. The mediating role of appearance comparisons and the moderating role of direction of comparisons were also tested. A survey was distributed to 303 adolescent girls from three secondary schools in Singapore. Results indicated that the negative associations between participants' photo browsing and editing behaviors and body esteem were fully mediated by peer appearance comparisons. Contrarily, selfie posting had a direct and positive association with body esteem that was not mediated by peer appearance comparisons. The findings suggested that objectifying standards of beauty may permeate adolescent girls' value systems through frequent appearance comparisons on social media. When peer influence was presented in the form of appearance comparisons, it had a strong negative association with body esteem, regardless of the direction of the comparisons involved. The positive relationship between selfie posting and body esteem suggested that peer interactions may benefit adolescent girls' body image development in specific ways that warrants further inquiry.

Keywords: body esteem, objectification, selfie, self-presentation, social comparison, social media

1. Introduction

As the most prevalent form of photographic self-presentation on social media in recent years, selfies have become an important way for users to present themselves, to connect with others, to develop a sense of belonging to a community, and to evaluate their own body image through the lenses of other people (Taylor, Parker, Morin, Patten, & Brown, 2014). Various tools such as mobile apps and photo filters afford social media users the ability to edit their selfies and present what is perceived as a more desirable self-image in front of a virtual audience (Perloff, 2014). Selfie taking and selfie posting have become prevalent among young girls (Anderson & Jiang, 2018b). However, the selfie culture's emphasis on physical appearance coupled with users' proclivity towards presenting the ideal self has stoked growing concerns regarding the impact of selfies on body image disturbance (Bell, Cassarly, & Dunbar, 2018; Meier & Gray, 2014).

During the transition to adulthood, adolescent girls experience physical changes and identity development and are likely to be self-conscious about their bodies and peer perceptions of them (Harter, 1993; LaFontana & Cillessen, 2010; Yau & Reich, 2018). Boyd (2014) noted that adolescent girls post on social media with their peers in mind and desire to be part of the imagined community. Empirical evidence showed that perceived poor evaluation from peers on social media can bring about negative impacts on adolescent girls' psychological well-being (e.g., Li, Chang, Chua, & Loh, 2018). These prior studies suggest that selfies—as a new avenue for image display, could provide both opportunities for consuming beauty ideals and for peer interactions. In turn, the two may interact to shape adolescents' body perceptions. The newly emergent form of peer communication through selfie sharing illustrates a need to examine both photo-based social networking behaviors and peer comparisons in adolescent girls' body image

evaluation. Specifically, this study focuses on selfie practices on Instagram, the most popular image-focused social media platform among teens (Anderson & Jiang, 2018a).

The relationship between social media use and body image has been the subject of a growing body of research (e.g., de Vries, Peter, de Graaf, & Nikken, 2016; Fardouly, Pinkus, & Vartanian, 2017; Howard, Heron, MacIntyre, Myers, & Everhart, 2017; Modica, 2019; Smith, Hames, & Joiner, 2013; Tiggemann, Hayden, Brown, & Veldhuis, 2018). In a systematic review, Holland and Tiggemann (2016) compared 20 studies—covering cross-sectional and longitudinal studies and concluded that most studies found empirical support for the negative effect of overall social media use on body image. However, among the various studies, they only found one that examined the influences of both social media use and social comparison on body image disturbance (referring to Fardouly & Vartanian, 2015). Through their systematic review and our review of more recent studies, we identified a few deficiencies in the current literature. These include a lack of focus on image-focused social media platforms, the oversimplified measure of social media use by usage time or frequency (see examples in Eckler, Kalyango, & Paasch, 2017; Fardouly & Vartanian, 2015; Sampasa-Kanyinga, Chaput, & Hamilton, 2016; Tiggemann & Slater, 2014), limited research on the underlying processes that may mediate or moderate the development of body dissatisfaction; a relative surplus in coverage of college and high school samples (see examples in Cohen, Newton-John, & Slater, 2018; Fardouly & Vartanian, 2015; Kim & Chock, 2015) and insufficient attention paid to younger samples, and a general dearth of research from the global community. Our study's focus on Instagram, Singapore adolescents, different types of selfie practices, and the mediating and moderating roles of peer comparisons added to efforts to fill these gaps in the existing pool of literature.

1.1. Selfie Practices and Body Esteem

Objectification theory and social comparison theory form the theoretical basis of this study. The former describes the theoretical relationship between selfie-related behaviors (i.e., photo browsing, posting, and editing) and body esteem; the latter justifies the need to test the mediating and moderating roles of peer appearance comparisons. Objectification theory holds that cultural norms create social environments in which women and girls regularly experience evaluation of their worth based on the physical, exterior part of themselves (Fredrickson & Roberts, 1997). Calogero, Tantleff-Dunn, and Thompson (2011) argued that media, including the Internet, frequently frame women as objects to be evaluated and gazed upon. The socially constructed need to control one's body for surveillance, to look for approval from others, and to meet narrowly defined standards of beauty increases the risk of various negative mental health outcomes such as shame, anxiety, body dissatisfaction, and low body esteem especially among females (see examples in Grogan, 1999; Moradi & Huang, 2008).

Research has indicated that females are under constant pressure to conform to beauty norms (Grogan, 1999). On social media, young girls are exposed to idealized beauty standards by means of image viewing, image sharing, and image making (e.g., Bazarova & Choi, 2014; Fox & Vendemia, 2016). Calogero et al. (2011) proposed that through the portrayal of idealized images of everyday people, social media normalize the objectifying standards and promote users' body surveillance and body dissatisfaction. For adolescents, a core function of online social networking is to seek social approval and feedback (see examples in Beyens, Frison, & Eggermont, 2016; Li et al., 2018; Yau & Reich, 2018). Accordingly, the selfie culture may predispose adolescent girls to experience objectification (i.e., being watched) and self-objectification (i.e., internalizing the gaze) during the social networking processes of selfie

browsing, posting, and editing (Bell et al., 2018).

Selfie browsing reflects a variation of Internet appearance exposure that involves the exposure to images produced by both professionals and amateurs (Mingoia, Hutchinson, Wilson, & Gleaves, 2017). In a meta-analysis of 25 experimental studies, Groesz, Levine, and Murnen (2002) concluded that viewing media ideals can lead to body dissatisfaction. With respect to the influences of Internet appearance exposure, research has consistently found relationships between general social media use (i.e., frequency or usage time) and body image outcomes such as appearance concerns, weight dissatisfaction, and intention to lose weight (e.g., Eckler et al., 2017; Fardouly, Diedrichs, Vartanian, & Halliwell, 2015; Sampasa-Kanyinga et al., 2016; Tiggemann & Slater, 2013). Meier and Gray (2014) were among the few scholars who focused on photo activities on Facebook and found a correlation between photo viewing and body image concerns. To replicate and extend these findings in photo-based social media environments, we assumed a negative association between Instagram photo browsing and body esteem.

Selfie posting is a form of online self-presentation that involves one's backstage preparation of self-portrait photographs and front-stage display of preferred self-images that are perceived to best represent oneself (Hogan, 2010). Goffman (1959) described self-presentation as individuals' intentional performance motivated by the awareness of an evaluative audience. Mendelson and Papacharissi (2010) argued that photographic self-presentation on social media requires individuals' conscious or subconscious efforts to portray a highly selective, manicured, and hoped-for version of themselves. Haferkamp, Eimler, Papadakis, and Kruck (2012) found that many women were highly concerned about their appearances when posting selfies online because they wanted to present what they believe is the best image of themselves. The negative relationship between selfie posting and body esteem is worth more investigation. However, only

until recently have new studies emerged in the U.S. and Australian contexts that found a negative relationship between frequent selfie sharing and negative health outcomes such as anxiety, reduced confidence, and disordered eating (Cohen et al., 2018; Mills, Musto, Williams, & Tiggemann, 2018). To provide more evidence in support of the emergent findings, we posited a negative relationship between Instagram selfie posting and body esteem in our study.

Selfie editing represents an additional step of backstage preparation of online self-presentation (McLean, Paxton, Wertheim, & Masters, 2015). The prevalence of mobile applications and computer programs simplifies the process for social media users to present the most favorable self-image. These applications and programs provide users with a bevy of tools and strategies such as adjusting photo effects, correcting imperfections, and taking multiple photos and deleting those that did not make the cut (see Chae, 2017; Choi & Behm-Morawitz, 2018; Mills et al., 2018). While this process of selfie editing may empower users to exercise more control over impression management (Tiidenberg & Gómez Cruz, 2015), it might not immunize users from self-objectification (Veldhuis, Alleva, Bij de Vaate, Keijer, & Konijn, 2018). New evidence suggests that photo retouching may encourage women to engage in body surveillance and heighten their awareness of their imperfections, which can lead to increased anxiety and reduced confidence in their physical attractiveness (Mills et al., 2018). To add to the limited research on adolescent girls' new roles as image creators and the impact on their body image, we posited a negative association between Instagram selfie editing and body esteem.

In this study, we focused on the concept of body esteem to evaluate adolescent girls' body image concerns. Body esteem refers to a person's self-evaluation of his or her body and appearance (Mendelson, Mendelson, & White, 2001). The perception of one's physical properties constructs a specific dimension of general self-esteem, referring to one's overall

satisfaction with him- or herself as a person (Franzoi & Shields, 1984; Rosenberg, 1965). Body esteem can stem from affective evaluations of one's physical attractiveness, physical conditions, weight satisfaction, and appraisals attributed to others (Franzoi & Herzog, 1986). Selfies are usually taken in head-and-shoulder shots highlighting the face and upper body. To examine relationships between selfie practices and body image, the corresponding outcome variable should be able to address the visual features of selfies. Body esteem's composition of the face and physical aspects of self-evaluation makes it a suitable body image variable in this study.

1.2. Peer Appearance Comparisons as the Mediator

Apart from the direct relationship between selfie practices and body esteem, the mediating role of peer appearance comparisons was also examined in this study. Social comparison theory holds that individuals are driven to evaluate their beliefs, opinions, and capacities by comparing themselves to similar others (Festinger, 1954; Wood, 1996). Through collecting social information, a person can assess themselves in relation to others and react to discrepancies with cognitive, affective, and behavioral responses (Suls & Wheeler, 2000). Myers and Crowther (2009) conducted a meta-analysis with 156 studies and concluded that media appearance comparisons can account for body dissatisfaction to a significant degree. Empirical data suggest that a perceived discrepancy between real and ideal body image may be associated with a lower level of body esteem, more concerns about eating and shape, and a higher risk for disordered eating (e.g., Ferguson, Muñoz, Garza, & Galindo, 2014; Fitzsimmons-Craft et al., 2012; Grabe, Ward, & Hyde, 2008; Thompson & Stice, 2001). Differing from traditional mass media, social media offer adolescent girls more opportunities to be exposed to images of known others and engage in peer comparisons (see Boyd, 2014). Peers are vastly more relatable than celebrity and media ideals. Perloff (2014) noted that today's social media

users are equipped with image filters and other editing apps to perfect their selfies and narrow the gap between enhanced self-images and ideal beauty. The heightened possibility of being able to present an idealized self through selfies poses a new question: when everyone can be image creators on social media, how would the comparison of enhanced self-images among peers influence adolescent girls' body esteem? Implied in this question is a need to advance knowledge about the relationships among online self-presentation, peer comparisons, and body esteem in the era of user-generated and user-distributed content.

Body image researchers have argued that girls perform habitual body surveillance and develop perceptions of their physical attractiveness through constant comparisons of their bodies to socially sanctioned standards of beauty (Quinn, Chaudoir, & Kallen, 2011; Vandebosch & Eggermont, 2012). This suggests a mediating role of social comparison in the relationship between exposure to ideal beauty and body image evaluation. However, while much research has examined the direct, negative effect of comparisons to media ideals on body dissatisfaction (see Myers & Crowther, 2009), the mediating influences of peer appearance comparisons in cyberspace are under-studied. Currently, only one study has examined the mediating influences of peer appearance comparisons on the relationship between social media use and body image (Fardouly & Vartanian, 2015). Because the predictor variable was measured by time spent on Facebook, this study was unable to address the complex dynamics of different selfie practices, peer appearance comparisons, and body esteem. More precise measurement is thus required to better study the mediating role of peer appearance comparisons.

1.3. Direction of Appearance Comparisons as the Moderator

In addition to examining the mediating function of appearance comparisons, in this study we took into account the influence of comparison direction. Social comparison theory posits that

comparisons may go either downward or upward; each direction can guide individuals to generate distinct evaluations of themselves (Wood, 1996). Downward comparison involves comparisons between a person and similar others who are perceived as less fortunate or worse off than oneself. It reflects a defensive tendency that enables the enhancement of mood and feelings of self-worth (Suls, Martin, & Wheeler, 2002; Wills, 1981). In contrast, upward comparison refers to the comparison of oneself against those perceived to be superior. This type of comparison may lead to psychological outcomes such as lower self-regard and drive to self-enhancement (see Collins, 1995; Sulz et al., 2002). Meta-analyses indicated that appearance comparisons to media ideals are likely to be in the upward direction; i.e., that individuals may compare to better-off targets and come up short (Groesz et al., 2002; Myers & Crowther, 2009). However, peers on social media are more immediate within a person's social circle than media characters and can be slightly better or worse off than oneself in different circumstances (Lee, 2014). Thus, when interacting with peers, the upward/downward dichotomy might not be definite or unchangeable. Some studies have found that both upward and downward comparisons may take place in peer appearance comparisons on social media (Chua & Chang, 2016; Fox & Vendemia, 2016; Vartanian & Dey, 2013). While downward comparisons promote self-enhancement, upward comparisons evoke greater body dissatisfaction, lower self-esteem, and higher risk of self-harming behaviors (Fardouly & Vartanian, 2015; Johnson & Knobloch-Westerwick, 2014). Considering the potential impact of directionality on comparison outcomes, we expected that direction of appearance comparisons may moderate the relationship between peer appearance comparisons and body esteem in the studied context. Upward comparisons may show a negative relationship with body esteem and downward comparisons may show a positive relationship with body esteem.

1.4. The Present Study

We had three objectives for this study. First, we sought to investigate the associations between selfies and body esteem by exploring three aspects of selfie practices—photo browsing, posting, and editing. Extant research suggests that social media users play multiple roles as receivers, exhibitors, and evaluators in image-based activities, and each role reflects a context in which social media use shapes individuals' body image concerns (Kim & Chock, 2015; Veldhuis et al., 2018). As such, it is important to explore users' selfie practices—which are mostly lumped together in past studies (see Holland & Tiggemann, 2016). By distinguishing exposure, exhibition, and editing, we were better able to examine their specific relationships with body image concerns. We hypothesized that adolescent girls' (a) Instagram photo browsing, (b) posting, and (c) editing behaviors would be negatively associated with their body esteem (H1).

Second, in this study we sought to investigate the underlying processes between selfie practices and body esteem from the perspective of peer appearance comparisons. As Perloff (2014) has indicated, social media platforms are peer-based and users tend to make appearance comparisons with peers rather than with models, celebrities, and other media personalities. This is particularly true among adolescent girls who place great importance on relationship maintenance and group belonging (LaFontana & Cillessen, 2010). Thus, we hypothesized that peer appearance comparisons would mediate the associations between adolescent girls' (a) Instagram photo browsing, (b) posting, and (c) editing behaviors and their body esteem (H2).

Third, we sought to better capture appearance comparisons by taking directionality into account. Past studies indicated that individuals may engage in both upward and downward appearance comparisons in social media, which affect their body satisfaction in different ways (Chua & Chang, 2016; Fox & Vendemia, 2016). Thus, we hypothesized that direction of

appearance comparisons would moderate the relationship between peer appearance comparisons and adolescent girls' body esteem. Specifically, upward comparisons would be negatively associated with body esteem and downward comparisons would be positively associated with body esteem (H3).

The context in which this study is located adds a further contribution. Our study contributes to the literature on appearance comparisons in non-Western contexts, where relevant research remains scarce (see Holland & Tiggemann, 2016). Lee, Taniguchi, Modica, and Park (2013) were among the first who used a non-Western sample to examine college Facebook users and their comparison behavior. They found that Korean women were more likely to engage in peer appearance comparisons and experience body dissatisfaction than their American counterparts. The authors attributed the difference to a distinction between individualism (the U.S. context) and collectivism (the Korean context). Intercultural research has indicated that collectivist societies such as Asian countries emphasize group homogeneity that feeds the desire to compare (Hui & Triandis, 1986). Girls from Asian contexts may have a high tendency to compare online peer images and subjugate themselves to peer portrayals of beauty standards. This illustrates a need to conduct more studies exploring the relationships among selfie practices, peer appearance comparisons, and body esteem in non-Western settings.

2. Method

2.1. Participants

Participants were 303 adolescent girls from three secondary schools in Singapore. Half of the participants (51%) attended a co-educational school and the other half (49%) attended a single-sex school. About two-thirds of the participants aged 12-14 years old (61%) and another one-third aged 15-16 years (38%). This age range aligned with our focus on girls at younger

ages. The distribution by ethnicity was Chinese (72%), Malay (14%), Indian (8%), Eurasian (1%), and other (5%).

2.2. Procedure

Paper and pencil survey data were collected between October 2016 and March 2017. The research team acquired approvals from both a university Institutional Review Board and the Ministry of Education Singapore to recruit adolescent participants from secondary schools. After receiving ethics approvals, we contacted two co-educational schools and one single-sex (female) school in three different districts of Singapore via e-mail. As Singapore has two types of secondary schools: co-educational and single-sex, our collaboration with both types of schools helped maximize diversity in the sample.

After getting permission from the schools, we visited each of them, and with assistance from school teachers, we recruited students that met our purposive sampling criteria, which were (a) adolescent girls aged 12 to 18 years old and (b) Instagram users who posted selfies. All students who met the criteria were invited to participate in the survey. We instructed potential participants about our survey, including our purpose of understanding adolescent users' selfie practices and self-evaluation of physical appearance, the sampling criteria, the data collection process, and the voluntary basis of their participation. We also assured them of data confidentiality. We then distributed participant information sheets, consent forms, and parental consent forms to all qualified students. These documents contained all the information mentioned above as well as contact details of the corresponding researchers and a representative of the university's Institutional Review Board. We returned to collect parental consent and participant consent forms two weeks later. Subsequently, school teachers helped facilitate the survey with voluntary participants (who gave both parental consent and participant consent) in

school. We collected the answered questionnaires from each school after another two weeks. The survey was conducted in English, which is the official language of instruction in the Singapore education system. Prior to the survey, a few school teachers looked through the questionnaire to ensure readability. In total, 580 questionnaires were sent out, of which 303 (52%) were returned complete.

2.3. Measures

All variables tested in this survey had an average item nonresponse rate between 0% and 5% except BMI (6.9%). All variables were constructed by averaging the scores of the items under respective scales. Pairwise deletion and full information maximum-likelihood methods were used to handle missing data in subsequent statistical analyses.

2.3.1. Selfie practices. Three types of selfie-related activities on Instagram were tested in this study. Browsing referred to the girls' viewing of other people's IG photos, which was measured with two items (1 = *not at all*, 2 = *once a day*, 3 = *every few hours*, 4 = *every hour*, 5 = *every 30 minutes*, 6 = *every 10 minutes or less*): "On a typical day, how often do you check Instagram, even if you are logged on all day?" and "On a typical day, how often do you browse the Instagram posts of peers you follow?" These items were averaged to create a scale that was reliable ($r = .81, p < .001$). Posting referred to young girls' sharing of selfies on Instagram, which was measured with an open-ended item: "How many selfies do you post on Instagram in a typical week?" Editing referred to the preparation process that involved the use of apps or multiple shots to modify or enhance self-images. Editing was measured using three items on a 5-point scale (1 = *never*, 5 = *always*): "Before posting a selfie on Instagram, how frequently do you use photo-editing apps to modify your facial features or body shapes?," "How frequently do you use filters to enhance colors and effects?," and "How frequently do you take multiple pictures of

yourself in order to post the best shot on Instagram?” (Cronbach’s $\alpha = .68$).

2.3.2. Peer appearance comparisons. Three items adopted from Thompson, Heinberg, and Tantleff-Dunn’s Physical Comparison Scale (1991) were modified to measure respondents’ frequency of appearance comparisons to peers on a 5-point scale (1 = *never*, 5 = *always*): “When interacting with peers on Instagram, how often do you compare your physical appearance to the physical appearance of others?,” “How often do you compare how you are dressed to how other people are dressed?,” and “How often do you compare your figure to the figure of other people?” (Cronbach’s $\alpha = .92$).

2.3.3. Direction of appearance comparisons. Direction of appearance comparisons was measured using two items adapted from Fardouly and Vartanian (2015): “When comparing yourself to each of the following people on Instagram, how do you rate yourself? Close female friends who you follow on Instagram and also regularly hang out with” and “Female peers who you follow on Instagram but do not regularly hang out with.” A 5-point scale was used to measure the extent to which respondents rated themselves worse or better than the targeted people (-2 = *much worse*, -1 = *worse*, 0 = *neither worse nor better*, 1 = *better*, 2 = *much better*). While a positive sign indicated a respondent’s perceived superiority to others in the comparison, a higher score reflected the magnitude of the ratings. These items were averaged to create a scale that was reliable ($r = .85, p < .001$).

2.3.4. Body esteem. Mendelson, White, and Mendelson’s Body Esteem Scale (1996) was adopted and modified to measure body esteem. The original scale contains 20 items and has demonstrated satisfactory reliability and validity in previous research (Mendelson et al., 2001; Tiggemann & Slater, 2014). Participants were asked to rate how they viewed their looks and weight on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*). Sample items included: “I

like what I see when I look in the mirror,” “I often wish I looked like someone else,” and “I really like what I weigh.” To test the performance of the scale, we conducted a principal component analysis and found that only 16 items can be loaded on one factor with factor loadings above .50 and eigenvalue greater than 1. After closely reading the four items with poor loadings, we found they were unable to generate a second factor and could be reflected by other items. Thus, we eliminated them and kept the other 16 items to construct the scale for further analysis (Cronbach’s $\alpha = .93$).

2.3.5. Demographics. Participants were asked to report demographic information including age, ethnic background, school type, weight, and height. The last two demographic variables were used to calculate the body mass index (BMI; kg/m^2).

3. Results

In this study, we hypothesized that participants’ photo browsing, posting, and editing behaviors would be negatively associated with body esteem (H1) and the relationship is mediated by peer appearance comparisons (H2). We also hypothesized that the direction of appearance comparisons moderates the mediating function of peer appearance comparisons (H3). Prior to hypothesis testing, zero-order correlation analyses were performed with all variables (see Table 1). Among the control variables, age was positively correlated with direction of appearance comparisons. The ethnicity variable, Chinese, which was dummy coded (0 = not Chinese, 1 = Chinese), was negatively correlated with browsing, posting, editing, and peer appearance comparisons, and was positively correlated with direction of appearance comparisons. Attending a single-sex school was positively correlated with direction of appearance comparisons. BMI was the only control variable that had a significantly negative relationship with body esteem, and was included in subsequent analyses as a control variable.

To test H1, a multiple regression analysis was performed using photo posting, editing, and browsing as the predictors and BMI as the covariate. Together, the four variables accounted for 11% of the variance in body esteem (adjusted $R^2 = .11$, $F(4, 256) = 9.27$, $p < .001$). As predicted, browsing was negatively associated with body esteem ($\beta = -.22$, $p < .001$). However, posting was positively associated with body esteem ($\beta = .14$, $p < .05$) and the association between editing and body esteem was nonsignificant ($\beta = -.10$, $p > .05$). Thus, H1a was supported, but H1b and H1c were not.

A path analysis with maximum likelihood was performed to test H2 using AMOS 25.0. To conduct mediation tests, each independent variable was allowed to be freely related to the mediator and the criterion variable, which resulted in a nearly saturated model with good model fit. Results of path analysis indicated that posting behavior had a direct association with body esteem but not with peer appearance comparisons. Both browsing and editing behaviors were positively associated with peer appearance comparisons, whereas their direct relationships with body esteem were nonsignificant (see Figure 1). Peer appearance comparisons had a strong negative association with body esteem. Altogether, the model accounted for 42% of the variance in body esteem.

Bootstrapping procedures with 5,000 resamples were used to test the statistical significance of the indirect associations between browsing and editing behaviors and body esteem that were mediated by peer appearance comparisons. Table 2 shows that the standardized indirect relationship between browsing behavior and body esteem was $-.23$ ($p < .001$) and that between editing behavior and body esteem was $-.13$ ($p < .01$). The results supported the mediating function of peer appearance comparisons. In sum, posting behavior had a direct association with body esteem, and this relationship was not mediated by peer appearance

comparisons. H2b was not supported. Browsing and editing behaviors had significant indirect relationships with body esteem, while their direct relationships with body esteem were nonsignificant. The findings suggested a full mediating function of peer appearance comparisons, supporting H2a and H2c.

H3 related to the moderating function of direction of appearance comparisons. Frequency analysis showed that one-third of the respondents (32%) believed that they were worse than their peers in terms of appearance. The majority (63%) rated themselves equal to their peers, and only 5% thought that they were better off. Given the small percentage of the better-off group, the moderator, direction of appearance comparisons, was recoded into a variable with two categories: the worse-off group and the equal and above group. To test H3, two path models were created in AMOS and a pairwise comparison of coefficients was performed to compare all paths between the worse-off model and the equal and above model. Table 3 shows that although some paths behaved differently between the two models, none of the difference reached statistical significance. The path from peer appearance comparisons to body esteem did not differ significantly between the worse-off model and the equal and above model, suggesting that direction of appearance comparisons did not moderate the mediating influences of peer appearance comparisons on body esteem. In other words, disregarding whether participants engaged in downward, lateral, or upward comparisons, the direction of such comparisons did not alter the strong impact of appearance comparisons on body esteem. H3 was not supported.

4. Discussion

In this study, we examined young girls' dual roles as selfie observers and presenters and the dynamics of their selfie practices, peer comparisons, and self-evaluation of body esteem on

social media. The results showed that both photo browsing (i.e., girls as observers) and posting (i.e., girls as presenters) were directly associated with the girls' body esteem though in different directions. Photo browsing was negatively associated with body esteem, whereas photo posting was positively associated with body esteem. Peer appearance comparisons fully mediated the relationship between photo browsing and body esteem and that between photo editing and body esteem. The predicted moderating function of direction of appearance comparisons was not found. The findings of varying direct and indirect relationships between selfie-related behaviors and body esteem suggested that social media-based peer interactions may influence young girls' judgment of their own beauty in various ways.

As image receivers, adolescent girls' browsing behavior was negatively associated with their body image concerns. Similar to past body image research (Holland & Tiggemann, 2016), our study supported a negative relationship between appearance exposure and body image satisfaction. Although images created by peers might not be as "ideal" as media images, they could still draw a negative link between photo browsing and body esteem. Wertheim and Paxton (2011) proposed that beauty norms shared by peers can be sources of pressure on young girls' constant body awareness that promotes body dissatisfaction, particularly due to physical proximity and psychological closeness. Results of this study illustrated that elevated appearance exposure on Instagram may increase the girls' opportunities to gaze upon others and judge themselves. The finding of peer appearance comparisons as a significant mediator further supported this view that browsing peer images on Instagram provided a benchmark for young girls to surveil their exterior beauty. In line with objectification theory and social comparison theory (Quinn et al., 2011; Wood, 1996), our results offered additional support to the claim that appearance exposure promotes young girls' judgment of their own beauty through comparison,

regardless of the source of idealized images (e.g., public figures or peers) and the platform on which they are displayed (e.g., conventional mass media or social media).

As image exhibitors, girls engaged in selfie posting and editing behaviors that linked to their sensemaking of beauty. Our findings indicated that selfie posting and editing were associated with body esteem through different paths and in different directions. Past research indicated that selfie editing may reflect young girls' response to the perceived need to improve their self-portrait photos and meet the societal standards of beauty (Chua & Chang, 2016; McLean et al., 2015). The significant indirect relationship between editing and body esteem suggested that when young girls took action to conform to objectifying standards of beauty, they were also likely to engage in social comparison to ascertain their position among peers and check their fulfillment of peer-recognized beauty norms. Moreover, the indirect relationship was negative. This indicated that for those who frequently performed selfie editing practices, the hope for displaying preferred self-images was often adversely accompanied with further doubts about their physical beauty through peer comparisons. The results echoed Quinn and colleagues' (2011) argument that selfie editing, peer appearance comparisons, and body dissatisfaction may reinforce each other in a circular process of cyber socialization. Limited by the cross-sectional design, we were unable to explore the circularity concept further. Our finding of a strong mediator of peer appearance comparisons nevertheless illustrated the critical role of social comparison in intervening in the relationship between young girls' efforts to display socially sanctioned beauty and a diminished appreciation of their own physical appearance.

The frequency of selfie posting had an unexpected positive relationship with body esteem in this study (in H1, we predicted a negative relationship between the two). Moreover, this relationship was not mediated by peer appearance comparisons and the significant association

was only found among those who thought they were less attractive than their Instagram friends. In previous social media studies, researchers have pointed toward narcissism to account for the positive relationship between online self-presentation and body esteem (Barry, Doucette, Loflin, Rivera-Hudson, & Herrington, 2017; Halpern, Valenzuela, & Katz, 2016; Lee & Sung, 2016). However, individuals with narcissistic personalities are typically prone to feeling superior to peers and center social comparison in their pursuits (Fox & Rooney, 2015; Krizan & Bushman, 2011). Considering both the nonsignificant relationship between selfie posting and peer appearance comparisons and the significant relationship between selfie posting and body esteem only evident in the worse-off group, the possibility of narcissism could be excluded without additional evidence.

Alternatively, the positive and direct relationship between selfie posting and body esteem implies that important social psychological factors besides social comparison may underpin young girls' online self-presentation behavior and drive their positive appraisals of their physical appearance. Findings from previous qualitative research suggested two possible factors: strategic pre-selection of images and peer support (Chua & Chang, 2016). From a strategic perspective, selfie posting could be a highly selective process. It was possible that from the onset, selfies were deliberately constructed to serve strategic purposes in demonstrating the best image of oneself. Hence, the efforts could result in positive peer feedback and help users develop assurance and confidence associated with high body esteem. In this study, girls in the worse-off group may be more cautious about their image management and engaged in more pre-selection practices. Accordingly, the pay-off was a positive relationship between well-prepared and curated online performance and a better feeling of their self-worth. In this view, social networking through selfie posting after careful backstage preparation could be somewhat

rewarding. From a support perspective, social comparison—without neglecting its impact on young girls' body esteem—might not be the only facet of peer interactions in cyberspace. Other types of peer interactions such as peer support may take place in social media and generate positive impacts on young girls' body image concerns (see Denmark & Paludi, 2007). The nonsignificant mediating role of social comparison in the positive relationship between selfie posting and body esteem suggested that positive outcomes are possible and peer interactions may occur in benign forms other than social comparison to enhance young girls' self-value and psychological well-being. The positive impact of selfie posting and its underlying social psychological mechanisms deserve more exploration.

Peer appearance comparisons in this study were examined in terms of their frequency and direction. Frequency of peer appearance comparisons was found to intervene in the relationship between photo browsing and editing and young girls' body esteem. However, the mediating power did not differ significantly between those who engaged in lateral and upward comparisons and those who engaged in downward comparisons. The results illustrated that young girls' feeling of superiority or inferiority to peers could not alter the negative association between peer comparisons and body esteem. Another relevant finding was the discovery of no apparent upward versus downward dichotomy in young girls' online appearance comparisons in the studied context. The majority of our participants considered themselves equal to their peers when being asked to rate themselves in comparison to their Instagram friends. While there was no obvious polarization in terms of comparison direction, for young girls there was a relationship between low body esteem and frequent peer comparisons. Our findings thus supported a unidimensional impact of appearance comparisons; i.e., that social comparison in general had a negative association with body image.

Altogether, findings from this study indicated that peer interactions in cyberspace may be correlated with young girls' body image concerns in various ways. When peer interactions were presented in the form of appearance comparisons, they predicted a negative association with body esteem. However, the positive relationship between selfie posting and body esteem suggested that peer interactions may also function in positive ways to help youngsters gain peer recognition and feel positive about their body image. On social media, peers can serve as the audience, the benchmark, the comparison target, and the information source of socially sanctioned beauty (Kim & Chock, 2015; Veldhuis et al., 2018). In this study we examined the comparison aspect of peer influences on body image. However, there is more to explore regarding other types of peer influences and their relationships with beauty norms and self-evaluation in the social media era. In particular, identifying more positive peer-related factors could help advance knowledge about young girls' cyber socialization processes and develop educational interventions beneficial to their development of self-worth and their appreciation of their unique beauty.

4.1. Limitations and Directions for Future Research

Four limitations should be taken into account when interpreting the results of this study. First, the use of a cross-sectional design restricted our ability to isolate theoretical factors and test causality. Future researchers should consider an experimental or longitudinal design to better capture the whole picture of the dynamics of objectification and peer influences on social media. Second, although our findings resonated with extant understanding of the importance of peer comparisons in Asian countries (e.g., Lee et al., 2013; Teo & Collinson, 2018), we did not compare participants across different cultural contexts. The collectivist culture embedded in Singapore (Triandis & Suh, 2002) may serve a background factor accounting for the

homogeneity in respondents' comparison direction. However, variations may also exist within collectivist cultures, which warrants more investigation. For instance, as presented in the results section, the dummy-coded variable (i.e., ethnic Chinese) was negatively associated with different selfie practices (browsing, posting, and editing) and peer appearance comparisons. This finding indicated some differences between ethnic Chinese and non-Chinese girls, though the differences did not significantly affect the results of our hypothesis testing. Replicating the study in other collectivist cultures or in comparative settings may help gain more insights into how cultural factors, beauty norms, and young girls' self-descriptions of beauty interact in cyberspace. Third, some relationships tested in this study showed small effect sizes. Given that this study was the first conducted in the region, there were no previous data available to suggest whether the small effect sizes were due to design-related reasons or theoretical reasons. Conducting more studies in similar cultures could help provide more empirical support for the predicted relationships among selfie practices, peer comparisons, and body image concerns. Finally, data used in this study were based on self-report surveys. Triangulating the survey data with content analysis or textual analysis may help enhance the explanatory power of the findings. Researchers might consider analyzing Instagram posts, comments, and feedback to gain more insight into the complex of selfie practices and peer interactions in the future.

4.2. Conclusion

Photo browsing, posting, and editing are ways for adolescent girls to interact with peers on Instagram. Although peer images are less idealistic than media images, objectifying standards of beauty may permeate young girls' value systems through frequent appearance comparisons. This study indicated that low body esteem did not distinguish between those who engaged in upward comparisons and those who engaged in lateral and downward comparisons.

Regardless of the comparison direction, the act of comparison may promote self-judgment that linked to body image disturbance. The positive relationship between selfie posting and body esteem suggested that peer interactions may have some positive implications for young girls' appreciation of their unique beauty and deserved more exploration. Findings from this study advance our understanding of young girls' social networking behaviors and are useful in informing body image education in Asian contexts.

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Table 1

Correlation Matrix of All Variables

	<i>M (SD)</i>	2	3	4	5	6	7	8	9	10
1. Age	14.22 (0.86)	.10*	.24***	.05	-.10*	-.02	-.08	-.08	.13*	.06
2. Chinese	0.72 (0.45)	—	.11*	.01	-.26***	-.26***	-.13*	-.26***	.14**	.01
3. Single-Sex School	0.51(0.50)		—	-.06	.08	-.06	.02	.07	.11*	.01
4. BMI	20.05 (3.74)			—	-.03	-.01	-.02	.01	-.01	-.24***
5. Browsing	3.25 (1.30)				—	.09	.29***	.43***	-.17**	-.23***
6. Posting	0.59 (1.33)					—	.18**	.01	.10*	.09
7. Editing	2.16 (0.94)						—	.38***	-.06	-.13*
8. Appearance Comparisons	2.30 (1.10)							—	-.50***	-.53***
9. Direction of Comparisons	-0.24 (0.56)								—	.35***
10. Body Esteem	3.04 (0.69)									—

Note. Chinese and single-sex school were re-coded to create dummy variables before calculation. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2

Direct and Indirect Associations Between Predictor Variables and Body Esteem

Predictor variables	Direct Association		Indirect Association via AC		Result
	Beta	95% CI	Beta	95% CI	
Browsing	.01	-.11, .12	-.23***	-.16, -.31	Full mediation
Posting	.13*	.01, .23	.01	-.06, .07	No mediation
Editing	.05	-.07, .12	-.13**	-.05, -.21	Full mediation

Note. AC = appearance comparisons. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3

Pairwise Comparison of Path Coefficients Between Two Groups

Path		Equal or Above Group	Worse-Off Group	Pairwise Comparison	
		B (SE)	B (SE)	z-score	Sig.
Browsing	→ Appearance Comparisons	0.23 (0.04)***	0.21 (0.08)**	-0.19	ns
Posting	→ Appearance Comparisons	-0.08 (0.07)	-0.01 (0.07)	0.67	ns
Editing	→ Appearance Comparisons	0.27 (0.06)***	0.08 (0.13)	-1.29	ns
BMI	→ Body Esteem	-0.05 (0.01)***	-0.04 (0.02)**	-0.10	ns
Browsing	→ Body Esteem	0.01 (0.04)	-0.03 (0.05)	-0.71	ns
Posting	→ Body Esteem	0.04 (0.05)	0.13 (0.04)***	1.49	ns
Editing	→ Body Esteem	0.03 (0.05)	0.04 (0.07)	0.05	ns
Appearance Comparisons	→ Body Esteem	-0.38 (0.06)***	-0.31 (0.06)***	0.82	ns

Note. Coefficients reported in this table are unstandardized. ** $p < .01$. *** $p < .001$. ns = nonsignificant.

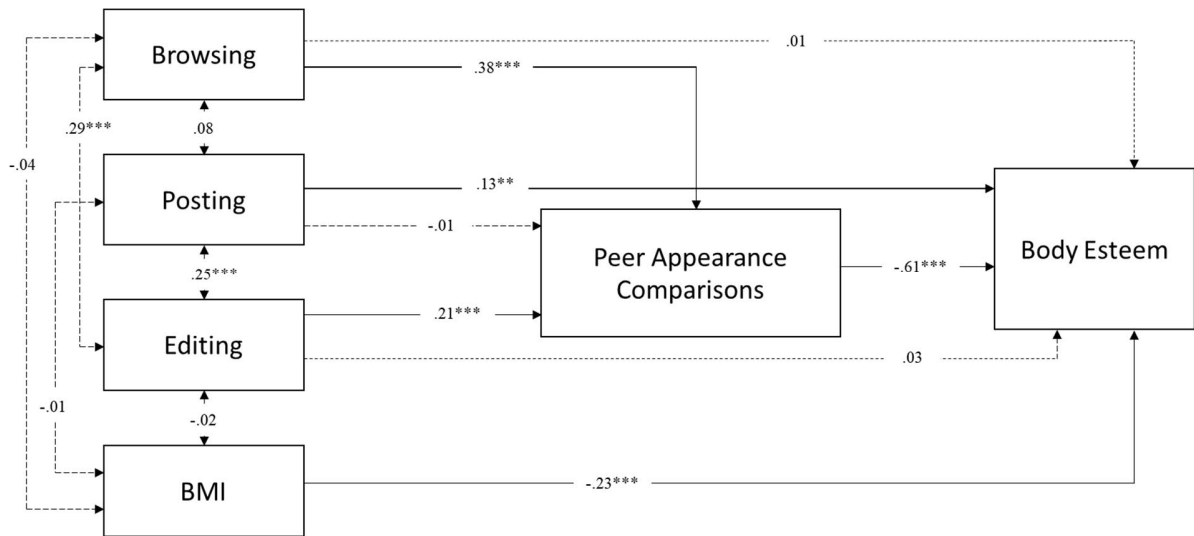


Figure 1. Results of path analysis, $\chi^2(1) = 0.01, p > .05$; CFI = 1.00; RMSEA = 0.00. All path coefficients are standardized. Dash lines indicate nonsignificant relationship. * $p < .05$. ** $p < .01$. *** $p < .001$.