



Face-to-Face and Cyber-Victimization: A Longitudinal Study of Offline Appearance Anxiety and Online Appearance Preoccupation

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Abstract

Most adolescents and young adults navigate seamlessly between offline and online social environments, and interactions in each environment brings with it opportunities for appearance concerns and preoccupation, as well as victimization and teasing about appearance. Yet, research has concentrated primarily on face-to-face victimization and its role in offline appearance anxiety symptoms in adolescents and young adults. To extend this to include cyber-victimization and online behaviors indicative of appearance anxiety, the present longitudinal study investigated the risk of face-to-face and cyber-victimization for offline appearance anxiety and online appearance preoccupation. Participants were 650 adolescents age 15 to 19 years ($M_{\text{age}} = 17.3$ years, 59% female) who completed two surveys over one-year. Correlations identified both forms of victimization as associated with offline appearance anxiety and online appearance preoccupation. Yet, in a structural equation model, face-to-face peer victimization, but not cyber-victimization, was uniquely associated with increased offline appearance anxiety and online appearance preoccupation from T1 to T2. Offline appearance anxiety and online appearance preoccupation strongly covaried and were bidirectionally associated over time. Female gender and age were associated with more anxiety and preoccupation. When gender moderation was tested, only the stability in appearance anxiety was moderated, with greater stability in females than males. Overall, offline and online appearance anxieties are highly interrelated and share a common risk factor in face-to-face appearance-related victimization by peers.

Keywords Victimization · Appearance anxiety · Body image · Social media use

Introduction

Appearance anxiety, a subclinical indicator of body dysmorphic disorder, is characterised by anxious preoccupation with personal physical deficits that are often not noticeable to others (American Psychiatric Association 2013). Although almost all past research has tended to concentrate attention on appearance anxiety symptoms that are exhibited offline, preoccupation with appearance and modification or camouflaging of appearance, which are the most salient features of appearance anxiety, are now increasingly exhibited online in social media environments (e.g., through filters and careful selection of photos) (Zimmer-Gembeck et al. 2020), especially given that one of the main purposes

of social media has become the viewing and sharing of photos and videos (Haferkamp et al. 2012; Sensis 2017). Notably, also, many adolescents and young adults place a high value on appearance, judge each other based on appearance, and frequently comment about appearance (Fildes et al. 2014). These judgements can be communicated in social interactions both offline and online, sometimes emerging as acts of bullying, victimization, and teasing (Bucchianeri et al. 2013; Nesi and Prinstein 2015). Given that youth now seamlessly move between online and offline social environments, research on victimization and psychopathology must keep pace by identifying interrelations between offline and online symptomatic behaviors. Yet, there is no published longitudinal research that has provided a balanced examination of both offline and online (i.e., face-to-face and cyber) appearance-related victimization by peers and their associations with offline appearance anxiety symptoms *and* online appearance preoccupation, while also testing bidirectional associations of offline appearance anxiety and online appearance preoccupation over time. In the current 2-wave longitudinal study,

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associations of face-to-face and cyber victimization with offline appearance anxiety and online appearance concerns were investigated.

Offline Appearance Anxiety and Online Appearance Preoccupation

Features of appearance anxiety include excessive appearance concerns and impairing, time-consuming behaviors, such as repetitive checking and excessive grooming to hide or camouflage flaws (Schmidt and Martin 2019). In past research, appearance anxiety symptom measures have tended to assess offline behaviors, such as checking appearance in a mirror (Veale et al. 2013; Roberts et al. 2018). In a separate body of research, however, there has been more direct attention on the distress, including social anxiety, that is associated with preoccupation with personal appearance online (Hawes et al. 2020; Vandenbosch and Eggermont 2012). Although there is not yet an agreed-upon gold standard measure to assess online appearance preoccupation, items used have focused on tapping social comparison processes (comparing personal appearance to the appearance of others), concerns about attracting comments about appearance, or checking or enhancing appearance in pictures (Zimmer-Gembeck et al. 2020). Comparing these core themes to items on widely used measures of appearance anxiety reveals how online behaviors could be indicative of appearance anxiety symptoms (and could be risks for body dysmorphic disorder or eating disorders). Yet, to date, research has not considered offline alongside online forms of appearance anxiety and preoccupation, which are referred to here as *offline appearance anxiety* and *online appearance preoccupation*, respectively. Thus, it is not yet known whether offline and online appearance anxiety and preoccupation are interrelated and whether they share risk factors.

Appearance-Related Face-to-Face and Cyber-Victimization by Peers

The cognitive-behavioral theory of the development of body dysmorphic disorder (Neziroglu et al. 2008; Veale 2004) highlights the instrumental role of teasing, victimization, and abuse for the development of appearance anxiety and its clinical manifestation—body dysmorphic disorder. More specifically, the theory posits that disorder is characterized by selective attention to distorted mental images of self, driven by self over-identification and the inflated importance of appearance-related self-schemas, leading to rumination and comparisons with an ideal appearance that is most likely unattainable. These maladaptive thoughts result in negative emotions (such as shame, anxiety, depression, hopelessness, anger, and

frustration) and lead to safety or self-protective behaviors (such as avoidance, escape, checking, seeking reassurance, and camouflaging of perceived appearance flaws). In turn, these restrictive and repetitive behaviors reinforce negative appraisals and preoccupation with self and appearance over time. A key risk factor for the development of these biases and distorted schemas, and the onset of excessive appearance apprehension, is early adverse interpersonal experiences, such as victimization and abuse (Buhlmann and Wilhelm 2004). In further support of this proposition, face-to-face peer teasing or victimization about appearance has been identified as a risk factor for appearance anxiety in adolescents (Webb et al. 2015) and young adults (Lavell et al. 2014).

Opportunities for appearance-related victimization exist in face-to-face interactions and during use of social media (Fardouly et al. 2017), broadening the traditional definition of victimization and bullying to include cyber forms as a source of risk (Modecki et al. 2014). Despite growing awareness of the desire for frequent online social connection for everyone, but especially for adolescents and young adults, research has only begun to consider both face-to-face and cyber-victimization as experiences that impact on the symptoms and beliefs that may increase appearance focus, worry, distress and preoccupation. Most markedly, the technology boom of the past two decades has expanded opportunities for victimization among young people. The time adolescents and young adults spend online, and the perpetual connectedness offered by mobile devices, provide the possibility of victimization that is not limited to physical time spent with peers. When applied specifically to appearance-related disorders, this online world has been described as a place where interactions that involve continuous and often enhanced visual images of the self and others can drive appearance anxiety (Brown and Bobkowsky 2011; Twenge et al. 2019). Online interaction, especially via social media, brings with it exposure to enhanced and idealised images, excessive feedback about appearance, appearance comparisons, and the possibilities for biased attributions as to the reasons for negative or ambiguous comments and responses from others (den Hamer and Konijn 2015; Sherman et al. 2016). Furthermore, there is evidence that face-to-face and cyber-victimization often co-occur (Modecki et al. 2014), and just as has been found for face-to-face victimization for a range of disorders (McDougall and Vaillancourt 2015) including body dysmorphic symptoms (Mastro et al. 2016), cyber-victimization is associated with more body dissatisfaction (Kenny et al. 2018) and lower body esteem (Olenik-Shemesh and Heiman 2017). This necessitates the simultaneous investigation of face-to-face and cyber forms of victimization as risks for the development of psychopathology (Baier et al. 2018).

Associations May be Conditional on Gender

The consumption of social media, social behaviors online, and the focus on appearance can differ by gender. For example, in one study that applied latent class analysis (Ohannessian and Vannucci 2018), groups of adolescent boys and girls were identified, with one high use group of girls using more social-entertainment features of technology and a high use group of boys using more games and computers. This social-entertainment focus of girls could result in more social risks online, and there is some research that supports this view. In particular, one meta-analysis reported that adolescent and young adult females experience slightly more cyber-victimization than males (Sun and Fan 2018; see also Dooley et al. 2010). In addition, although most studies find that the strength of the associations of peer victimization with self-perceptions, depression or anxiety do not differ in young females and males (McDougall and Vaillancourt 2015), there is evidence that specific social interactions, such as engaging in online social comparison, might have more negative impact on females than males (Berne et al. 2014; Nesi and Prinstein 2015). Such findings suggest gender differences when the focus is on appearance-related symptomatology, with females more likely to experience appearance-related concerns, such as anxiety and preoccupation, and the possibility that associations of face-to-face and cyber-victimization with appearance-related concerns would be stronger in females than males.

Age and Time Spent on Social Media

Age and time spent on social media were also covariates in the present study. Age was considered because it has been associated with appearance anxiety and online preoccupation in past research. For example, in one longitudinal study, offline appearance anxiety symptoms increased, on average, from age 11 to 16 for girls and boys (Zimmer-Gembeck et al. 2018), suggesting that there is some normative increase in a focus on personal appearance as young people get older. This age-related pattern of symptoms and preoccupation should be accounted for when examining other risk factors (see Ricciardelli and Yeager 2016).

Regarding social media use, it is ubiquitous among adolescents, but there is still some variability (Sensis 2017). Moreover, time spent on social media might be a marker of other behaviors associated with appearance concerns or peer victimization. More specifically, spending less time on social media might translate directly into less opportunity to experience cyber-victimization and less opportunity for online appearance preoccupation. Also, time spent on social media could covary with adolescents' particular interests; those who spend more time on social media might be drawn to it for the sharing opportunities and associated rewards of

feedback from others, whereas those who spend less time on social media could be drawn away because of other interests (e.g., sport, gaming). The aim here was to adjust for time spent on social media to address these potential alternative explanations for the study findings.

Current Study

Founded on the cognitive-behavioral model of the development of body dysmorphic disorder and empirical evidence that has identified victimization as a risk factor for appearance anxiety among adolescents and young adults, this 1-year longitudinal study extended past research by investigating face-to-face and cyber peer victimization as predictors of both offline appearance anxiety and online appearance preoccupation. It was hypothesized that offline appearance anxiety and online appearance preoccupation would be positively correlated and have positive bidirectional associations over time (Hypothesis 1). In addition, appearance-related face-to-face and cyber-victimization by peers were expected to uniquely predict increases in offline appearance anxiety and online appearance preoccupation (Hypothesis 2), and females, older participants, and those who spend more time on social media were expected to report more victimization and appearance concerns (Hypothesis 3). Finally, temporal associations of appearance-related face-to-face and cyber-victimization by peers with offline appearance anxiety and online appearance preoccupation were expected to be stronger in females than in males (Hypothesis 4).

Method

Participants

At T1 (year 2017), participants were 650 (59% female) 15-to-19-year olds ($M_{\text{age}} = 17.3$, $SD = 1.4$) originally recruited from (a) three Australian high schools ($n = 221$, 30%) and (b) an Australian university campus during an orientation week prior to the start of the academic year ($n = 429$, 70%). One year later, 490 of the original 650 (70%; 202 high school and 288 university students) completed a second survey. Four additional university students completed the T1 survey, but did not report their gender, so were excluded from this study.

To describe their sociocultural background, high school students endorsed one option, and university student participants ticked all that applied. The majority of high school students endorsed White/European (80.1%) or Asian (14.9%) ethnicity, with 1.0% endorsing First Nation People/Torres Strait Islander/Pacific Islander, and 4.0% endorsing another ethnicity. The majority of university students

endorsed White/European (79.7%) or Asian (12.2%) ethnicity, with 3.5% endorsing First Nation Peoples/Torres Strait Islander/Pacific Islander and 6.4% endorsing another ethnicity (e.g., African, East Indian, Korean). Mothers of high school students reported their education, with 19% completing some or all high school, 26% attending a trade school, 52% attended university, and 3% reported other. For fathers, 18% completed some or all high school, 31% attended a trade school, 49% attended university, and 2% reported other. University students reported on the education of their parents. Of the 99% who had contact with their mother, 16% reported that their mothers had not completed high school, 25% had completed high school, 20% had attended a trade school, 26% had attended university, and 13% had a postgraduate degree. Of the 96% who had contact with their father, 21% reported that their fathers had not completed high school, 17% had completed high school, 24% had attended a trade school, 24% had attended university, and 14% had a postgraduate degree.

To consider the representativeness of the students included in the present study, publicly available school and regional demographic information were accessed. It is important to note that questions regarding birth country and language spoken at home are often asked in Australia instead of the questions about race/ethnicity asked in the present study. The high schools from which the students were drawn reported that their student population (all grades) was approximately 52% boys, with 1% First Nation People or Pacific Islander, and about 20% spoke a language other than English at home. The schools reported that 10% of students were in the lowest income quartile, 61% in the middle two income quartiles, and 29% in the highest income quartile. In the region where the study was conducted, 64% of adults were born in Australia, 1.7% endorsed Australian First Peoples or Pacific Islander, 17% of adults had a university degree (18% Year 12 high school maximum, 12% Year 10 high school maximum, with 53% reporting some education beyond high school), and 45% were married. Although direct statistical comparisons could not be made, study participants had a higher proportion of girls than in the school population but was otherwise representative of the school population demographics. In comparison to the region, the participants in this study had parents who were more educated, which was reflected in an higher income level. Participants also had a higher proportion of married parents than in the regional adult population.

T1 and T2 Measures

Offline appearance anxiety symptoms

At T1 and T2, the 10-item Appearance Anxiety Inventory (Veale et al. 2013) was completed to measure symptoms

characteristic of body dysmorphic concerns, reflecting the diagnostic criteria outlined in the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association 2013). Participants reported the frequency of symptoms (e.g., *I avoid situations or people because of my appearance*) on a 5-point scale (1 = *never*, 5 = *always or almost always*). A total score was calculated by summing item responses, with higher scores reflecting more symptoms, Cronbach's α were 0.89 at T1 (0.86 for male, 0.90 for females) and 0.92 at T2 (0.91 for male, 0.91 for females).

Online appearance preoccupation

At T1 and T2, five items from the Social Media Appearance Preoccupation Scale (Hawes et al. 2020; Zimmer-Gembeck et al. 2020a) were used to measure online appearance preoccupation (e.g., *I feel inadequate in appearance compared to my friends on social media*). Response options ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). A total score was formed by averaging item responses, Cronbach's α were 0.92 at T1 (0.91 for male, 0.91 for females), and 0.92 at T2 (0.88 for males, 0.93 for females).

T1 Only Measures

Appearance-related face-to-face victimization and cyber-victimization

Two items derived from the Perception of Teasing Scale (POTS; Thompson et al. 1995) were used to assess face-to-face appearance-related victimization by same-gender and other-gender peers (*Do people your age (your peers) make fun of, or tease you, about your weight or looks?*). Two similar items were used to assess appearance-related cyber-victimization on social media by same-gender and other-gender peers (e.g., *In the past year, how often have you been teased about the way you look on social media?*). Responses options ranged from 1 (*never*) to 5 (*often*). Total scores were formed by averaging the two items for face-to-face victimization ($r = 0.67$, $p < 0.001$, 0.62 for male, 0.72 for females) and the two items for cyber-victimization ($r = 0.60$, $p < 0.001$; 0.61 for males, 0.60 for females). Items have been employed in previous studies as indices of appearance-related peer victimization (e.g., Lavell et al. 2018).

Social media use

Two items measured time spent on social media per weekend day and per weekday; response options ranged from 1 (*less than 30 min*) to 5 (*more than 3 h*). Prior to completing items about social media use, participants read the following: *Social media includes all the websites and*

applications that you use to create and share content with others or to participate in social networking such as Facebook, Instagram, Snapchat, Twitter, Tumblr, or Periscope. Given that reported weekday and weekend use were highly correlated ($r = 0.78$, $p < 0.001$; 0.80 for male, 0.75 for females), an average score was created and used in all analyses.

Procedure

The current study was approved by the Griffith University Human Research Ethics Committee (Protocol 2013/13) prior to contacting schools (six schools were contacted with three agreeing to participate) and parents or university students about participation. The high school students in this study had been participants in a 5-wave longitudinal study (years 2013–2015; grades 5–7 in 2013); their parents were recontacted via email to ask for consent for their children's participation in an additional two waves (for this group, wave 6 and 7 in years 2017–2018). Student assent was also obtained. The cyber-victimization and online appearance preoccupation measures used in this study had not been completed in previous waves. The original high school student participants represented 42% of all students in the schools, and, of these, 79% consented to participate in the current study. At T1, students from two schools completed the 30-min survey either by mail or online, while one school opted for students to complete surveys during school time. At T2, all students completed the survey online after individual contacts. Each high school participant received a \$20 gift card at each time of assessment. All these participants remained in high school at T2 (i.e., no student had transitioned to university).

The remaining participants were young university students recruited from all areas of study across a large Australian urban university. Most university students were personally recruited in 2017 by research assistants in common use areas (e.g., library, and cafes) and, at T1, completed a hard copy survey under research assistant supervision. Participants were also recruited through the first-year psychology research participation program where they completed the survey online at T1. Participants who completed the T1 hard copy survey on campus received a chocolate bar, cupcake or coffee voucher (61%); those recruited through the research participation program received partial course credit (0.5% of the course, 39%). Students who completed the hard copy were not asked to report their area of study. At T2, all university students were individually recontacted to complete the T2 survey online and all received a coffee voucher for their participation.

University students, compared to high school students, reported more T1 (but not T2) offline appearance anxiety symptoms, $t = -2.81$, $p < 0.01$, T1 (but not T2) online

appearance preoccupation, $t = -2.18$, $p = 0.03$, and face-to-face appearance-related victimization, $t = -6.98$, $p < 0.001$. Relative to high school students, university students spent more time on social media, $t = -3.57$, $p < 0.01$. Participants retained at T2 were also compared to those not retained. There was one difference; more cyber-victimization was reported by those retained, $t = -2.30$, $p = 0.02$.

Data Analyses

Of the 650 participants, 14 had not completed one or multiple (a maximum of 9) single items on any measure and Little's MCAR test confirmed that this small amount of missing data was completely at random ($p = 0.99$). As such, total scores were formed from completed items for these 14 youth. This left missing data for 184 adolescents or young adults (28%) who did not participate at T1 ($n = 20$ high school students missed T1 but not T2) or did not participate at T2 ($n = 164$ were lost to T2 follow-up). SPSS v26 multiple imputation (set to 20 imputations) was used to estimate all missing scores for those who did not participate in either T1 or T2 to maintain all 650 participants in all analyses. Preliminary analyses included producing descriptive statistics for all measures, Pearson correlations between all measures, and independent groups t -tests to compare males and females on all measures. Pooled results (i.e., pooling of results across the 20 imputed datasets) are reported for these preliminary analyses. When pooled results were not available in SPSS, values were manually pooled by averaging across the 20 sets of results.

To test a predictive model of T2 appearance anxiety symptoms and online appearance preoccupation, structural equation modelling was conducted using AMOS v.26 software. Full Information Maximum Likelihood estimation was used, which estimated missing data and maintained all 650 participants for the analyses. Model fit was determined by multiple fit indices, including the χ^2 test statistic and the comparative fit index (CFI; Bentler and Bonett, 1980). A nonsignificant χ^2 test statistic indicates a very good fitting model, but this statistic is highly sensitive to sample size, so it is standard practice to report a range of other fit statistics. CFI values over 0.90 indicate a good model fit. An estimate of error due to the approximate fit of the model was also assessed using the root mean square error of approximation (RMSEA; Browne and Cudeck 1992), which is interpreted as a good fit if values are below 0.05, a fair fit if values are between 0.05 and 0.08, and a mediocre fit if values are between 0.08 and 0.10 (Kaplan 2000). In this model, predictors of T2 offline appearance anxiety and online appearance preoccupation included face-to-face and cyber victimization, time spent on social media, gender, and age. In addition, the stability in appearance anxiety and appearance preoccupation (i.e., controlling for T1 measures of appearance anxiety symptoms and online appearance

preoccupation) was estimated and the cross-lag associations of appearance anxiety with appearance preoccupation were also freed. In the SEM results reported here, time spent on social media was not significantly associated with any other variables in the model, so was removed.

Building on this model, gender was tested as a potential moderator of all model associations by fitting a 2-group model that freed covariances and directional paths to differ by gender. To determine if gender moderated any of these directional paths, the fit of this 2-group model with paths freed was compared to a model with all covariances and directional paths fixed to gender equality. Follow-up models were fit to isolate specific paths moderated by gender, whereby one path was freed at a time and compared to the fit of a model with all paths fixed to gender equality.

Results

Descriptive Statistics, Gender Differences, and Correlations between all Variables

Means (*M*s) and standard deviations (*SD*s) of all variables, for the total sample and separately for males and females, are presented in Table 1. As shown, females, compared to males, reported more offline appearance anxiety and online appearance preoccupation at T1 and T2, and reported more time spent on social media.

As shown in Table 2, for both males and females, there were strong positive correlations between repeated measures of offline and online appearance anxiety/preoccupation, *r*s ranged from 0.50 to 0.63, and there were strong, significant positive correlations between concurrent measures of offline appearance anxiety and online appearance preoccupation, *r*s ranged from 0.60 to 0.70. Also, as expected, face-to-face and cyber-victimization were significantly positively correlated with offline appearance anxiety and online appearance preoccupation concurrently, *r*s ranged from 0.19 to 0.42, and over time,

*r*s ranged from 0.18 and 0.40. Time spent on social media was concurrently associated with appearance anxiety and preoccupation, *r*s ranged from 0.15 to 0.27, and time spent on social media was intermittently associated with victimization. Males' (but not females') age was positively associated with T1 offline appearance anxiety, T1 online appearance preoccupation, and face-to-face peer victimization.

Full Models Predicting T2 Appearance Anxiety and Appearance Preoccupation

Full sample

The first model of appearance-related victimization by peers as predictors of T2 appearance-related concerns had a good fit to the data based on the CFI but had a less than adequate fit based on other indicators, $\chi^2(9) = 118.40$, $p < 0.001$, CFI = 0.94, RMSEA = 0.137 (90% CI 0.116–0.159), $p < 0.001$. As can be seen in Fig. 1, the model effects accounted for 47% ($R^2 = 0.472$) of the variance in T2 appearance anxiety and 48% ($R^2 = 0.484$) of the variance in T2 appearance preoccupation. There was support for H1, with the bidirectional associations between offline appearance anxiety and online appearance preoccupation suggesting an escalating cycle of appearance-related concerns, worries, and interference in day-to-day living, with more T1 appearance anxiety symptoms associated with a greater increase in appearance preoccupation by T2, $\beta = 0.15$, $p < 0.001$, and T1 online appearance preoccupation associated with a greater increase in appearance anxiety symptoms by T2, $\beta = 0.28$, $p < 0.001$. H2 was partially supported; face-to-face victimization had a unique positive and significant association with T2 offline appearance anxiety, $\beta = 0.11$, $p < 0.01$, and with T2 online appearance preoccupation, $\beta = 0.10$, $p < 0.01$. However, cyber-victimization was not a significant predictor of T2 appearance anxiety or preoccupation, $\beta = 0.04$ and -0.07 , respectively. Furthermore, providing mixed support for H3, gender (being female) was

Table 1 Means and standard deviations of all variables, and results of t-tests comparing males with females on all measures

Measured variables	All <i>M</i> (<i>SD</i>) <i>N</i> = 650	Males <i>M</i> (<i>SD</i>) <i>n</i> = 266	Females <i>M</i> (<i>SD</i>) <i>n</i> = 384	<i>t</i> (1,648)	<i>p</i>	Cohen's <i>d</i>
Offline appearance anxiety	25.40 (8.05)	22.99 (7.34)	27.07 (8.11)	−6.47***	<0.001	0.53
T2 offline appearance anxiety	24.43 (9.01)	22.05 (8.50)	26.08 (8.99)	−5.15***	<0.001	0.46
Online appearance preoccupation	3.12 (1.73)	2.43 (1.50)	3.59 (1.71)	−8.90***	<0.001	0.72
T2 online appearance preoccupation	3.20 (1.75)	2.53 (1.48)	3.67 (1.77)	−7.93***	<0.001	0.70
AR cyber-victimization	1.51 (0.75)	1.53 (0.81)	1.49 (0.71)	0.67	0.505	0.05
Face-to-face AR victimization	1.90 (0.97)	1.83 (0.91)	1.94 (1.01)	−1.41	0.159	0.11
Time spent on social media	3.35 (1.25)	2.99 (1.31)	3.59 (1.15)	−6.12***	<0.001	0.49

All measures were completed at T1 except where indicated with T2. AR appearance related.

*** $p < 0.01$, **** $p < 0.001$

Table 2 Pearson correlations between all study variables for males and females ($n = 650$)

Measured variables	1	2	3	4	5	6	7	8
1. Offline appearance anxiety	–	0.63**	0.66**	0.50**	0.36**	0.26**	0.17**	0.02
2. T2 offline appearance anxiety	0.51**	–	0.54**	0.70**	0.27**	0.24**	0.11*	0.00
3. Online appearance preoccupation	0.60**	0.52**	–	0.60**	0.29**	0.19**	0.15**	-0.01
4. T2 online appearance preoccupation	0.34**	0.64**	0.50**	–	0.18**	0.18**	0.15**	-0.05
5. AR cyber-victimization	0.39**	0.36**	0.41**	0.20*	–	0.48**	0.10	0.05
6. Face-to-face AR victimization	0.39**	0.40**	0.42**	0.30**	0.55**	–	0.11*	0.25**
7. Time spent on social media	0.27**	0.13	0.23**	0.14	0.14*	0.10	–	0.09
8. Age	0.18**	0.11	0.16**	0.08	0.02	0.19**	0.07	–

All measures were completed at T1 except where indicated with T2. Correlations for males are below the diagonal. Correlations for females are above the diagonal. AR appearance related

* $p < 0.05$. ** $p < 0.01$

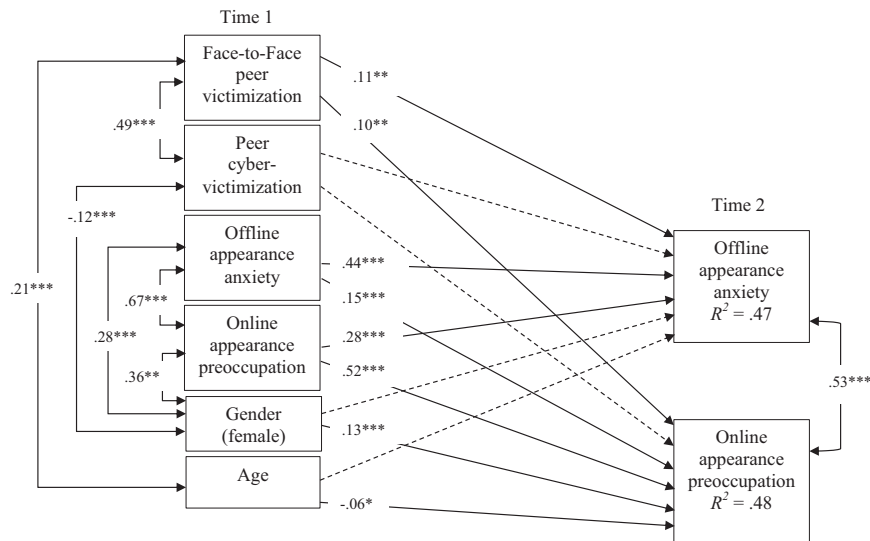


Fig. 1 Results of the structural equation model of T1 appearance-related victimization as related to T2 offline appearance anxiety and online appearance preoccupation ($N = 650$). Note. Standardized coefficients are shown. Dotted lines indicate directional paths that were not significant, but were estimated. Time spent on social media was not significantly associated with any other variables in this model, so was

removed. Witnessing of cyber-victimization was also measured, but was not related to T2 offline appearance anxiety or online appearance preoccupation so was not reported here in any detail. $\chi^2(9) = 118.40$, $p < 0.001$, CFI = 0.94, RMSEA = 0.137 (90% CI 0.116 to 0.159), $p < 0.001$. * $p < 0.05$. *** $p < 0.001$

positively, and age was negatively, associated with T2 online appearance preoccupation. Gender and age were not significantly associated with T2 offline appearance anxiety. As described previously, time spent on social media was not associated with any other measures in this model and was removed.

Gender as a moderator

To test H4, the covariances and directional effects in the model were all freed to differ for males and females. This 2-group model had an adequate fit on the CFI but a less than adequate fit on other indicators, $\chi^2(14) = 148.67$, $p < 0.001$, CFI = 0.92, RMSEA = 0.122 (90% CI 0.105 to 0.140),

$p < 0.001$. To determine if there was gender moderation of any effect in this model, the fit was compared to a model with all paths fixed to gender equality. There was a small difference in fits suggesting gender moderation of at least one path, $\Delta\chi^2(14) = 25.85$, $p < 0.05$. Follow-up analyses to isolate the path or paths that were moderated by gender (i.e., fixing specific paths and comparing to a model with all paths fixed to gender equality), revealed that it was one path—the stability in offline appearance anxiety—that differed significantly between males and females; as shown in Fig. 2, the association between T1 and T2 offline appearance anxiety was $\beta = 0.52$ ($p < 0.001$) in females but a significantly weaker $\beta = 0.31$ ($p < 0.001$) in males. In addition to this moderated path, Fig. 2 shows that, in both males and

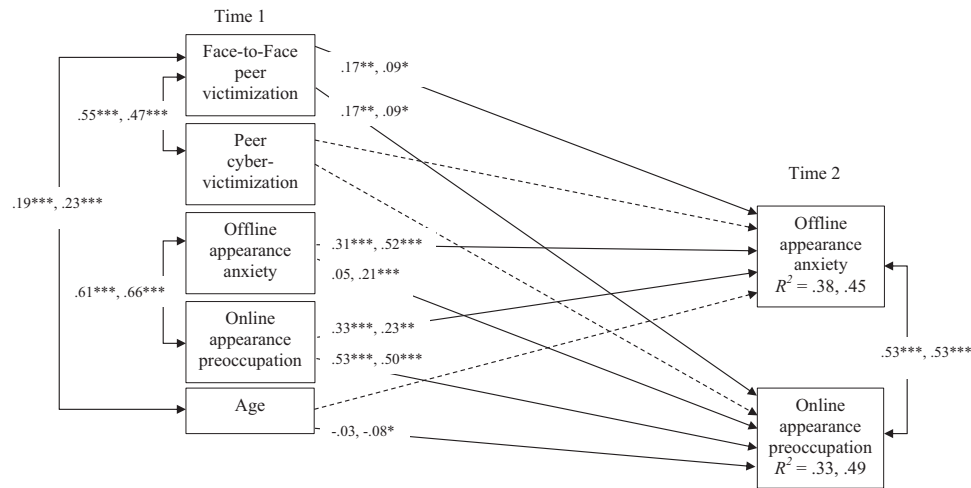


Fig. 2 Results of the 2-group structural equation model of males' and females' T1 appearance-related victimization as related to T2 offline appearance anxiety and online appearance preoccupation ($N = 650$). *Note.* Standardized coefficients are shown with the value for males listed first on each path. Dotted lines indicate directional paths that were not significant for males and females. Time spent on social media

was not significantly associated with any other variables in this model, so was removed. Witnessing of cyber-victimization was also measured, but was not related to T2 offline appearance anxiety or online appearance preoccupation so was not reported here in any detail. $\chi^2(14) = 148.67$, $p < 0.001$, CFI = 0.92, RMSEA = 0.122 (90% CI 0.105 to -0.140), $p < 0.001$. * $p < 0.05$. *** $p < 0.001$

females, there were significant effects of face-to-face peer victimization on T2 offline appearance anxiety, $\beta = 0.17$, $p < 0.01$ for males and $\beta = 0.09$, $p < 0.05$ for females, and T2 online appearance preoccupation, $\beta = 0.17$, $p < 0.01$ for males and $\beta = 0.09$, $p < 0.05$ for females. The effects of cyber-victimization on T2 offline appearance anxiety and T2 online appearance preoccupation were not significant for either males or females, all $\beta < 1.061$, all $p > 0.05$. As before for the full sample, there were bidirectional associations between offline appearance anxiety and online appearance preoccupation in both males and females, β 's ranged from 0.21 to 0.33, all $p < 0.001$, with the exception of a non-significant temporal association of T1 offline appearance anxiety with T2 online appearance preoccupation in males, $\beta = 0.05$, $p > 0.05$. Regarding age, there was a negative association between age and T2 online appearance preoccupation in girls, $\beta = -0.08$, $p < 0.05$, but this association was not significant in males.

Discussion

Adolescents and young adults often seamlessly move between offline and online social environments, and their attention to manipulating and managing the visual nature of these interactions brings with it many new opportunities for appearance anxiety and preoccupation (Holland and Tiggemann 2016; Kim and Chock 2015), as well as appearance-related victimization by peers (Sumpter et al. 2012). Yet, there has been little consolidation of research on risks for offline appearance anxiety symptoms with risks for online appearance

preoccupation. Founded in the cognitive-behavioral model of the development of body dysmorphic disorder (Buhlmann and Wilhelm 2004; Veale 2004), the aim of the current study was to place a lens on the risk presented by peer face-to-face and cyber-victimization for symptoms of appearance anxiety displayed offline and online.

Peer Victimization, Offline Appearance Anxiety, and Online Appearance Preoccupation

Findings showed that adolescents and young adults who report more appearance victimization (face-to-face and cyber) have concurrently higher levels of offline appearance anxiety and online appearance preoccupation, and this was found for both males and females. Moreover, in a multivariate longitudinal model, face-to-face victimization, but not cyber-victimization, was the unique risk factor associated with increases in both offline appearance anxiety and online appearance preoccupation in the multivariate models tested here. Additionally, offline appearance anxiety and online appearance preoccupation influenced each other over time, yielding even more increase in symptoms of anxiety and preoccupation. Also, as predicted, females reported that they spent more time on social media, experienced more symptoms of appearance anxiety, and were more preoccupied with their appearance online, but gender moderated only one association, with offline appearance anxiety more stable over a year in females than in males.

The present study findings extend past research from these same data (and from similar Australian studies) that investigated adolescents' experience of face-to-face peer

victimization about appearance as a risk factor for offline appearance anxiety, either concurrently (Lavell et al. 2014; Zimmer-Gembeck and Webb 2017) or over time (Webb et al. 2015; Zimmer-Gembeck et al. 2018). The main extensions in the present study were identifying the covariation between face-to-face and cyber-victimization experiences, and the strong covariation between offline and online behaviors that could all be symptomatic of body dysmorphic disorder. The findings that adolescents who report face-to-face victimization about appearance also report more cyber-victimization about appearance is consistent with a previous review that concluded strong covariation across contexts in adolescents' experiences of verbal, relational and social teasing and victimization (Modecki et al. 2014). Additionally, the present study findings are consistent with theory suggesting that appearance-related peer victimization is a precursor of worries, beliefs and behaviors that are early signs of body dysmorphic disorder symptomatology (Veale and Neziroglu 2010).

Face-to-face and cyber-victimization measured here covaried with each other, and each had concurrent associations with heightened appearance concerns. However, it was appearance-related face-to-face peer victimization, rather than cyber-victimization, that was the unique correlate of an increase in offline appearance anxiety *and* online appearance preoccupation over a year. Face-to-face victimization may be a unique correlate because, different from cyber-victimization, it involves a combination of verbal comments, criticism, or attention to appearance often combined with non-verbal behaviors. This combination may be more salient and memorable than written comments or posts online, resulting in a stronger unique impact of face-to-face victimization for developing offline behaviors indicative of appearance anxiety. Experiencing appearance-related teasing and comments in-person alongside non-verbals could clarify the aggressor's intentions, making them more salient, harmful, and less easy to dismiss or ignore. Cyber-victimization may be more ambiguous in form, given there are usually no or few associated non-verbal behaviors to guide interpretation.

Moreover, face-to-face peer victimization might occur via different sources and, by definition, could occur across many more contexts when compared to cyber-victimization. Harm could be elevated when the source is someone you are trying to get to know better or that you find appealing in person, when the source involves a new and less well-known group of peers or involves people you know well-enough to interact with in-person. Although there is little information regarding sources of victimization in face-to-face vs. cyber environments, it is quite possible that the source of negative comments might differ when comparing offline to online contexts, and this difference might explain the unique impact of face-to-face victimization.

Finally, the ability to modify appearance when using online apps, but not having this available for face-to-face interactions, might result in a feeling that face-to-face victimization is more tied to "real" appearance. Thus, the feeling that appearance is more accurately on display or more accurately perceived during face-to-face interactions may make it easier to interpret victimization or teasing about appearance as evidence of actual perceived appearance flaws, making face-to-face victimization feel more personal and directly relevant to the self-concept, triggering even more concerns and attempts to hide flaws and check appearance over time.

The findings also suggest two complex pathways to appearance-related symptomatology that could be examined in future longitudinal research with more waves of data than were available here (i.e., three waves or more). First, when the temporal effects of peer victimization are considered alongside the bidirectional temporal paths between offline appearance anxiety and online appearance preoccupation, it is possible that appearance anxiety mediates the association of face-to-face peer victimization with online appearance preoccupation or vice versa. Such possibilities could be tested in future research. Second, being female was associated with increased online appearance preoccupation from T1 to T2, but not with offline appearance anxiety. Yet, when considered alongside the bidirectional temporal paths between offline appearance anxiety and online appearance preoccupation, this seems to suggest that preoccupation mediates the impact of gender on appearance anxiety. This possibility could be tested in future research as well. Finally, previous research identifies young women as more likely to be drawn to social communication and photo sharing online (Ohannessian and Vannucci 2018). This is generally consistent with the findings in the present study, but it would be worth directly measuring these specific online behaviors as potential risk factors in future research on appearance-related or body image concerns and appearance anxiety symptom development.

Gender Moderation

Guided by theory and building on past research (Myers and Crowther 2009; Vandenbosch and Eggermont 2012; Veale and Neziroglu 2010), it was hypothesized that associations of peer appearance-related victimization with offline appearance anxiety and online appearance preoccupation would be stronger for females than males. This hypothesis was not supported; gender did not moderate any of the directional relationships in the tested model, other than the stability in offline appearance anxiety over time (with females' appearance anxiety more stable than males'). Although an updated review of the literature is needed, the evidence seems to be leaning towards little support for

gender differences in the predictors of appearance-related concerns. For example, in a meta-analysis, Menzel et al. (2010) concluded there was little evidence of a gender difference in the relationship between appearance teasing and body dissatisfaction in adult populations; despite body dissatisfaction being higher in females than males. Another study (Karazsia et al. 2017) found that body dissatisfaction in girls and women is higher than dissatisfaction in boys/men when it is oriented towards thinness, but higher in boys and men when it is oriented towards a muscular physique. Such a gender pattern suggests that differences emerge in body or appearance concerns when measures focus on one more than the other or link dissatisfaction to either thinness or muscularity. Yet, such differences may be less likely when considering behaviors indicative of appearance-related concerns, as was the focus of the present study. Also, complicating this further, there is emerging evidence that some young women may focus on thinness, others on muscularity, and others on both fitness and thinness (Uhlmann et al. 2020). Overall, the study of the development of all appearance-related disorders will benefit from considering contemporary changes to, and individual variation in, beliefs about ideal body types coupled with the widespread and ever-changing opportunities for messaging about these ideals and social comparison.

Age

University students reported more anxiety and preoccupation, as well as more face-to-face victimization than high school students. When age itself was examined, associations were again found. These findings suggest that appearance concerns do not dissipate in young adulthood and, instead, increase. However, the negative association of males' age with online appearance preoccupation in the model testing gender moderation, does suggest that there could be a slight decline in online appearance preoccupation as males get older. These somewhat mixed findings for age, when simultaneously considering gender, deserves attention in future research.

Study Limitations and Future Research Directions

There are five study limitations to note. First, the high school participants slightly over-represented females and participants from families in higher income quartiles than the schools/communities from which they were drawn. Also, the participants were mostly white Australian and Asian youth. Thus, the findings may not be generalizable to broader communities of adolescents and young adults in Australia or to youth outside of Australia. Second, all measures were self-reported. Thus, the associations may be affected by shared method variance or self-presentational

biases. In previous research, appearance-based victimization by peers has been measured using peer nomination techniques to identify victimized classmates (Zimmer-Gembeck and Webb 2017). Such an approach could be used in future research to replicate and extend the present findings.

Third, victimization was assessed with two items for face-to-face and two items for cyber-victimization. Such a limited number of items could have resulted in missing some cases of victimization. Yet, these items were developed based on other measures and have good face validity. Further, the two sets of two items had evidence of reliability given large correlations with each other, and the face-to-face measure had good predictive validity in past research. Fourth, there was no information on the content or source of victimization. A comprehensive assessment of victimization (i.e., assessing aspects of appearance targeted, such as hair, weight, or facial features vs. sexual harassment; victimization by friends vs. acquaintances) could provide a more precise understanding of risks for symptom development. The focus on peers as the source of victimization could have overlooked the impact of victimization by other sources. For example, research has found that negative body-related comments from romantic partners and a lack of romantic partner support in adulthood are associated with a higher level of body dissatisfaction and lower self-esteem (Weller and Dziegielewski 2005). Future research could focus on other content and source of victimization and teasing, but this might result in a more selected sample (e.g., those with a romantic partner) than was included here.

Finally, bidirectional associations between peer victimization and appearance concerns could not be examined in this study, given that face-to-face and cyber-victimization were not assessed at T2. A future study could address this gap, as it is possible that individuals with more concerns about appearance would be subject to more teasing and victimization in response to their concerns and associated social behaviors (e.g., withdrawal from social situations, overreactions to comments from others).

Practical Implications of the Findings

Given concerns about appearance and the desire to cosmetically enhance personal appearance are becoming almost normative, affecting a large proportion of both young women and men (Holland and Tiggemann 2016; Zimmer-Gembeck et al. 2018), it is critical that future research is conducted to identify how the elevated levels of rumination and preoccupation about appearance and associated negative emotions measured here transition into psychological disorders that can become chronic, eventually limiting social and career development, and potentially becoming even life-threatening (Mastro et al. 2016; Phillips and Cash 2012). Notably, much of the research, and many

interventions aimed at preventing and treating body dysmorphic disorder symptomology focus on girls and women, most likely because of their more elevated appearance anxiety and online behaviors indicative of appearance preoccupation. Yet, it is clear that male youth are not immune to body dysmorphic disorder (Karazsia et al. 2017; Phillips 2001), and, as found here, their appearance-related concerns are also more elevated when they report more experience with appearance-related victimization by their peers. When the present study findings are considered with these past study findings in mind, a way forward would be to take one of two approaches to reducing appearance anxiety and online appearance preoccupation when working with either females or males. The first approach would be to intervene with all young people to reduce victimization, in general, drawing upon effective anti-bullying programs and enhancing them to also focus on body image and appearance. The second approach would be to intervene with young people at risk (e.g., because of early elevations in appearance anxiety or behaviors indicative of online preoccupation) to provide them with cognitive and social skills to deflate their concerns; such an approach might include practicing new ways to cope with negative thoughts and emotions that transpire because of perceived appearance flaws.

Conclusion

Peer appearance-related victimization is a known risk factor for adolescent and young adult appearance concerns, but no previous study had considered longitudinal associations of victimization with appearance concerns occurring offline and online. In this study, offline appearance anxiety and online appearance preoccupation strongly covaried and were mutually influential over time. Also, appearance-related victimization by peers, especially face-to-face, was found to be a social-contextual risk factor for appearance anxiety symptoms and online appearance preoccupation. These associations did not significantly differ in females compared to males, but females are at greater risk for elevated appearance concerns. Overall, offline and online behaviors indicative of appearance concerns and preoccupation are closely intertwined and influence each other over time, while also sharing a common risk factor in appearance-related victimization by peers and unfolding similarly in females and males.

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final manuscript. The datasets generated and/or analyzed during the current study are not publicly available but are available from the corresponding author on request. The authors have no conflicts of interest to disclose. We thank Nina Horan and Juliane Pariz for their assistance with data collection and management. We also thank Allison Waters, Lara Farrell, Drew Nesdale, Geraldine Downey, and Wyndol Furman for advice on the larger project from which these data are drawn. This study was not preregistered but was detailed in a funded grant proposal to the ARC.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Consent to Participate Written informed consent was obtained from the legal guardians of all high school student participants, and students assented to participate. University students (all age 16 or older) provided written informed consent.

Ethical Approval This study was approved by the Griffith University Human Research Ethics Committee in accordance with the ethical standards as laid out in the 1964 Declaration of Helsinki and its later amendments.

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