

Appearance Comparisons and Eating Pathology: A Moderated Serial Mediation Analysis Exploring Body Image Flexibility and Body Appreciation as Mediators and Self-Compassion as Moderator

Iris Perey, Joerg Koenigstorfer*

Chair of Sport and Health Management, Department of Sport and Health Sciences, Technical University of Munich, Germany

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ABSTRACT

Comparing one's body against the bodies of others is related to lower positive body image and higher eating pathology. Underlying mechanisms as well as protective factors of these relationships are yet to be discovered. The present study examined body image flexibility and body appreciation as potential mediators of the association between appearance comparisons and eating disorder psychopathology. Additionally, it was tested whether self-compassion moderates the mediation effects. In an online sample comprising 250 women ($M_{age} = 42.66$, $SD = 12.24$), the inverse relationship between appearance comparisons and body image flexibility was mediated by body image flexibility and the positive relationship between appearance comparisons and eating disorder psychopathology was mediated by body image flexibility and serially mediated by body image flexibility and body appreciation, when controlling for body mass index and age. Simple mediations were further moderated by self-compassion, such that indirect effects were attenuated at high levels of self-compassion. Promoting body image flexibility may be one potential target for helping women to engage in less maladaptive and more adaptive ways of treating the body when comparing one's appearance. Building self-compassion may be another potential target that may protect body image flexibility and its correlates in the face of appearance comparisons.

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1. Introduction

Many women compare their bodies to those of peers and media images and consequently experience negative thoughts about body weight and shape (Fitzsimmons-Craft et al., 2015; Leahey, Crowther, & Mickelson, 2007; Leahey, Crowther, & Ciesla, 2011). The effects of appearance comparisons are commonly explained using sociocultural models of body dissatisfaction and eating disorders (e.g., Keery, van den Berg, & Thompson, 2004; Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999; van den Berg, Thompson, Obremski-Brandon, & Covert, 2002), which argue that frequently engaging in appearance comparisons is a risk factor for body and eating-related disturbances. Indeed, a great body of research demonstrates that heightened appearance comparison tendencies are associated with eating disorder psychopathology (Arigo, Schumacher, & Martin, 2014; Rodgers, Chabrol, & Paxton, 2011; van den Berg et al., 2002). Further, appearance comparisons have

been found to be inversely related to *body appreciation*, a form of positive body image which involves taking care of the body by proactively engaging in behaviors to accept, respect, and protect the body (Andrew, Tiggemann, & Clark, 2016; Avalos, Tylka, & Wood-Barcalow, 2005; Homan & Tylka, 2015; Siegel, Huellemann, Hillier, & Campbell, 2020; Tylka & Wood-Barcalow, 2015).

While potential predictors and outcomes of the tendency to engage in appearance comparisons have been extensively explored, underlying mechanisms and protective factors remain mostly unknown. These investigations are likely to have important implications for the development and refinement of interventions that reduce eating pathology and promote a positive stance towards the body.

1.1. The Mediating Roles of Body Image Flexibility and Body Appreciation

Cognitive-behavioral models of body image (i.e., Cash, 2011; Webb, Butler-Ajibade, & Robinson, 2014) propose that individuals react to cognitive processes, such as appearance comparisons, with different self-regulatory coping strategies (Cash, 2011; Webb et al., 2014). While eating disorders are conceptualized as maladaptive coping strategies, positive ways of thinking about and treating the

* Corresponding author at: Chair of Sport and Health Management, Department of Sport and Health Sciences, Technical University of Munich, Georg-Brauchle-Ring 60/62, 80992 Munich, Germany.

E-mail address: joerg.koenigstorfer@tum.de (J. Koenigstorfer).

body, such as body appreciation and body image flexibility, constitute adaptive strategies in managing distressing cognitions (Webb et al., 2014; Webb, 2015).

Body image flexibility presents the body image-specific version of psychological flexibility, which serves as the foundation and presumed mechanism of change in Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999) (Sandoz, Wilson, Merwin, & Kellum, 2013). It is defined as the capacity to experience and accept unwanted thoughts and feelings regarding the body so that one is able to engage in value-consistent action despite being concerned about body size, weight, or shape (Sandoz et al., 2013). In contrast, diminished levels of body image flexibility and attempts to avoid aversive ideas related to the body have been associated with enhanced eating disorder psychopathology as well as reduced body appreciation among non-clinical samples (see Rogers, Webb, & Jafari, 2018, for a review).

Importantly, a central assumption of ACT is that it is not the disturbing thoughts and feelings per se which elicit dysfunctional behaviors, but rather the way individuals *relate* to these cognitions (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). More specifically and related to body image, it may be the inability to flexibly approach body-related distress that accounts for the negative outcomes associated with unfavorable thoughts (Sandoz et al., 2013). In line with this reasoning, past research has explored diminished body image flexibility as a potential underlying mechanism of the association between dysfunctional body- and eating-related cognitions and maladaptive behavioral outcomes. For example, Wendell, Masuda, and Le (2012) revealed that, among U.S. female and male undergraduates, the relationship between disordered eating cognitions and disordered eating behaviors is partially attributable to low body image flexibility. Similarly, in a sample of college-bound females, body image flexibility has been found to partially mediate the association between body dissatisfaction, operationalized as body size discrepancy (i.e., the deviation between current and ideal body size), and body appreciation (Webb, 2015).

Surprisingly, even though cognitive-behavioral models of body image (i.e., Cash, 2011; Webb et al., 2014) explicitly mention appearance comparisons as potential harmful cognitive processes and body image flexibility has been found to explain women's behavioral responses to internal body image threats (e.g., Wendell et al., 2012; Webb, 2015), the mediating effect of body image flexibility in the context of appearance comparisons has only been investigated once. In this study, body image flexibility mediated the relationship between appearance comparisons with peers and inflexible eating among female Portuguese students (Ferreira, Trindade, & Martinho, 2016). Similarly, body image flexibility might also account for the connections between appearance comparisons and eating pathology as well as body appreciation. In other words, we suggest that the use of less adaptive and more maladaptive coping strategies in the presence of frequent appearance comparisons may not be a direct result of the comparison process, but may rather be attributable to the inability to openly confront distressing body-related cognitions.

Not only might appearance comparisons predict eating disorder psychopathology and body appreciation via body image flexibility separately, but the extent to which women appreciate their bodies may contribute to explaining eating pathology in this context. Consistent with this theorizing, body appreciation has been related to lower levels of eating pathology (Gillen, 2015; Tylka & Wood-Barcalow, 2015). Furthermore, there is evidence that body appreciation mediates the links between intrapersonal body image threats (e.g., perfectionism, self-objectification) and adaptive eating behaviors (i.e., intuitive eating; Augustus-Horvath & Tylka, 2011; Iannantuono & Tylka, 2012). Accordingly, the relationship between appearance com-

parisons and eating disorder psychopathology might be serially mediated by body image flexibility and body appreciation, respectively.

1.2. The Moderating Role of Self-Compassion

One promising candidate for addressing the etiology of poor body image and eating pathology is the cultivation of self-compassion (Braun, Park, & Gorin, 2016). *Self-compassion* involves responding to personal inadequacies or failures with self-kindness rather than self-criticism, a mindful stance rather than overidentification, and the understanding that challenges are part of the human condition rather than isolating experiences (Neff, 2003). Although self-compassion and body image flexibility intersect by both entailing awareness and openness as key processes, self-compassion is conceptually distinct in that it additionally involves self-directed warmth and understanding and is not limited to thoughts about the body (Neff & Dahm, 2015).

Theoretically, treating oneself with compassion when encountering distressing cognitions should allow individuals to effectively regulate arising affect and behavior (Sirois, Kitner, & Hirsch, 2015; Terry & Leary, 2011). In fact, research supports the theory that self-compassion serves a protective function against body and eating disturbances by interacting with risk factors, including heightened appearance comparison tendencies, to disrupt their detrimental effects (see Braun et al., 2016, for a review). Cross-sectional studies showed that the negative effect of appearance comparisons on body appreciation was moderated by self-compassion, such that this effect disappeared when women possessed high levels of self-compassion (Homan & Tylka, 2015; Siegel et al., 2020). However, other scholars have revealed inconsistencies in the protective role of self-compassion for the link between appearance comparisons and alternative positive body image constructs (e.g., appearance esteem) among girls and adult women (Modica, 2019; Rodgers et al., 2017). Additionally, the role of self-compassion within the association between appearance comparisons and eating disorder psychopathology has not yet been investigated. The mixed results for indicators of positive body image and the absence of research on eating disorder psychopathology point to the need for further examination to clarify whether self-compassion can ameliorate outcomes related to appearance comparisons.

The relationship between self-compassion and body image flexibility has as well received research attention, with results indicating that self-compassion is linked to higher levels of body image flexibility (e.g., Prowse, Bore, & Dyer, 2013; Schoenefeld & Webb, 2013; Webb & Hardin, 2016). Nevertheless, evidence of self-compassion as a moderator of the relationships between body image flexibility and other variables is sparse and has merely been explored in female undergraduate students by Kelly, Vimalakanthan, and Miller (2014), who found self-compassion to attenuate the negative association between body mass index (BMI) and body image flexibility, when controlling for self-esteem. To the best of our knowledge, no study has yet explored the protective role of self-compassion in the relationship between appearance comparisons and body image flexibility.

In their conceptual overview of body and eating-related protective factors, Tylka and Kroon Van Diest (2015) argue that self-compassion may, among other pathways, work by interrupting the mediational chains through which risk factors lead to maladaptive outcomes. In line with this proposition and the theoretical links outlined above, self-compassion might protect against decreased body image flexibility associated with appearance comparisons and, in turn, against low levels of body appreciation and high levels of eating disorder psychopathology.

1.3. The Present Research

The purpose of the present study was to explore the roles of body image flexibility and body appreciation as mediators and self-compassion as moderator in the connection between appearance comparisons and eating disorder psychopathology. We predicted that the associations between appearance comparisons and both eating disorder psychopathology and body appreciation would be mediated by body image flexibility. We also expected that there would be a serial mediation effect of appearance comparisons on eating disorder psychopathology via body image flexibility (first mediator) and body appreciation (second mediator). Further, we hypothesized that self-compassion would moderate the association between appearance comparisons and body image flexibility, such that the hypothesized simple and serial mediation effects would be conditional upon participants' levels of self-compassion.

2. Method

2.1. Participants and Procedure

Data were collected through Amazon's crowdsourcing website Mechanical Turk (MTurk). MTurk is recognized as a reliable and valid tool to gather high-quality data for social science research in general (Buhrmester, Kwang, & Gosling, 2011) and body image research specifically (Gardner, Brown, & Boice, 2012). The study was advertised as an exploration of "women's body and eating-related attitudes and behaviors." Female MTurk workers from the U.S. who had achieved at least a 98% approval rate and completed at least 10,000 hits were eligible for participation. The sample was limited to female workers since women, compared to men, have been found to more frequently engage in appearance comparisons and their body image seems to be affected more strongly by these comparisons (Davison & McCabe, 2005; Halliwell, 2012; Myers & Crowther, 2009). Consequently, self-compassion may be more likely to protect women, rather than men, from the body image and eating correlates of appearance comparisons.

Interested participants were directed to a survey link. After providing informed consent and indicating their gender (for verification of being female), women completed the measures described below in the listed order. Participants were each remunerated \$2.00 in exchange of their time. Women with large amounts of missing data due to early termination of the study (i.e., answering < 20% of all measure items, $n = 6$) were excluded from the data set. The final sample constituted a total of 250 women, which is considered sufficient based on the recommended sample size of at least 200 for structural equation models (Tomarken & Waller, 2005), as per our planned analysis. Participants were between 23 and 73 years ($M_{age} = 42.66$, $SD = 12.24$) with a BMI [$BMI = (\text{weight in pounds}/\text{height in inches}^2) \times 703$] between 14.88 and 55.08 ($M = 26.99$, $SD = 6.62$). Based on typically utilized BMI classifications, the sample breakdown was: 4.8% underweight (BMI less than 18.5), 40.8% normal weight (BMI between 18.5 and 24.9), 26% overweight (BMI between 25 and 29.9), and 28.4% obese (BMI of 30 and higher). The ethnic background of most participants was White/Caucasian (85.2%), followed by Black/African American (6.4%), Asian (3.2%), Hispanic/Latino (2.8%), and other ethnicities (2.4%). Participants' highest completed education level was some bachelor's degree (44.8%), college (33.2%), master's degree (10.8%), high school degree or less (9.2%), or doctorate (2.0%).

2.2. Measures

2.2.1. Appearance comparisons

The Upward and Downward Appearance Comparison Scale (UPACS/DACS; O'Brien et al., 2009) comprises 18 items rated from 1

= *strongly disagree* to 5 = *strongly agree*. The UPACS contains 10 statements on comparisons to people whose appearance is perceived as superior (upward comparisons; e.g., "I tend to compare myself to people I think look better than me"). The DACS contains eight statements on comparisons to people whose appearance is perceived as inferior (downward comparisons; e.g., "I compare myself to people less good looking than me"). UPACS/DACS scores have demonstrated internal consistency and construct validity among female undergraduates (O'Brien et al., 2009). Given that past research has indicated a strong positive correlation between the UPACS and the DACS among young women (Fardouly, Diedrichs, Vartanian, & Halliwell, 2015; O'Brien et al., 2009; Vartanian & Dey, 2013), items of both subscales were combined and averaged, with higher scores demonstrating a greater tendency to engage in appearance comparisons. Cronbach's alpha of the combined measure in the present study was .95.

2.2.2. Self-compassion

The Self-Compassion Scale (SCS; Neff, 2003) comprises 26 items rated from 1 = *almost never* to 5 = *almost always*. SCS items can be separated into six subscales measuring the three facets of self-compassion: (a) Self-Kindness (5 items; e.g., "I'm tolerant of my own flaws and inadequacies") versus Self-Judgment (5 items; e.g., "I'm disapproving and judgmental about my own flaws and inadequacies"), (b) Common Humanity (4 items; e.g., "I try to see my failings as part of the human condition") versus Isolation (4 items; e.g., "When I fail at something that's important to me, I tend to feel alone in my failure") and (c) Mindfulness (4 items; e.g., "When something upsets me I try to keep my emotions in balance") versus Over-Identification (4 items; e.g., "When I'm feeling down I tend to obsess and fixate on everything that's wrong"). Scores can be analyzed by calculating mean scores for the six subscales separately or/and by calculating a total score, for which negative subscale items are reverse scored and a grand mean of all subscales is computed. In the current study, both the total score as well as the subscale scores were utilized. While higher negative component (i.e., Self-Judgment, Isolation, and Over-Identification) scores indicate greater uncompassionate behavior, higher total and positive component (i.e., Self-Kindness, Common Humanity, and Mindfulness) scores indicate greater compassionate behavior. Scores on the SCS have shown internal consistency, 3-week test-retest reliability, and construct validity among primarily female U.S. undergraduates (Neff, 2003, 2016). In this study, Cronbach's alphas were .97 for the total score and .92, .92, .89, .91, .86, and .90 for Self-Kindness, Self-Judgment, Common Humanity, Isolation, Mindfulness, and Over-Identification, respectively.

2.2.3. Eating disorder psychopathology

The Eating Disorder Examination Questionnaire 6.0 (EDE-Q 6.0; Fairburn & Beglin, 1994) contains 28 items that assess eating disorder psychopathology over the past 28 days. Twenty-two items concern the intensity of psychopathology aspects, rated from 0 = *no days/none of the times/not at all* to 6 = *every day/every time/markedly*. These items yield a global score as well as four subscale scores representing Dietary Restraint (e.g., "Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight?"), Eating Concern (e.g., "Has thinking about food, eating or calories made it very difficult to concentrate on things you are interested in?"), Shape Concern (e.g., "Has your shape influenced how you think about (judge) yourself as a person?"), and Weight Concern (e.g., "How dissatisfied have you been with your weight?"). A global score is calculated by averaging the subscale scores, with higher scores reflecting higher levels of eating disorder psychopathology. EDE-Q scores have demonstrated internal consistency and 2-week test-retest reliability among various non-clinical female samples (see Berg, Peterson, Frazier, & Crow, 2012,

Table 1
Means, Standard Deviations, Score Ranges, and Bivariate Correlations between Variables.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
1. Appearance Comparisons	–												
2. Self-Compassion	-.46***	–											
3. Self-Kindness	-.26***	.86***	–										
4. Self-Judgment	.54***	-.88***	-.71***	–									
5. Common Humanity	-.14*	.76***	.75***	-.48***	–								
6. Isolation	.56***	-.85***	-.58***	.83***	-.47***	–							
7. Mindfulness	-.21**	.83***	.83***	-.58***	.76***	-.51***	–						
8. Over-Identification	.55***	-.86***	-.60***	.84***	-.45***	.85***	-.59***	–					
9. Body Image Flexibility	-.63***	.56***	.43***	-.64***	.23***	-.59***	.33***	-.57***	–				
10. Eating Disorder Psychopathology	.56***	-.50***	-.39***	.59***	-.19**	.54***	-.29***	.52***	-.84***	–			
11. Body Appreciation	-.40***	-.70***	.64***	-.65***	.46***	-.58***	.57***	-.63***	.63***	-.61***	–		
12. BMI	.05	-.10	-.05	.16*	.04	.15*	-.04	.13*	-.36***	.42***	-.30***	–	
13. Age	-.21**	.26***	.23***	-.20**	.19**	-.20**	.25***	-.22***	.23***	-.10	.13*	.03	–
<i>M</i>	2.77	3.07	3.07	3.11	3.15	3.06	3.30	2.92	59.84	2.00	3.17	26.99	42.66
<i>SD</i>	0.99	0.98	1.10	1.21	1.14	1.26	1.03	1.24	20.62	1.50	1.11	6.62	12.24
Range ^a	1–5	1–5	1–5	1–5	1–5	1–5	1–5	1–5	12–84	0–6	1–5	14.88–55.08	23–73

Note. *N* = 250; * *p* < .05; ** *p* < .01; *** *p* < .001 (two-tailed); ^a Ranges for appearance comparisons, self-compassion, self-kindness, self-judgment, common humanity, isolation, mindfulness, over-identification, body image flexibility, eating disorder psychopathology, and body appreciation represent possible ranges while ranges for BMI and age represent lowest and highest values among the sample.

for a review). In the current study, only the 22 items assessing the intensity of eating disorders were administered. Cronbach's alpha of the global score was .94.

2.2.4. Body image flexibility

The Body Image-Acceptance and Action Questionnaire (BI-AAQ; Sandoz et al., 2013) comprises 12 items (e.g., “Worrying about my weight makes it difficult for me to live a life that I value”), rated from 1 = *never true* to 7 = *always true*. All BI-AAQ items are reverse scored and summed, with higher scores representing greater body image flexibility. Scores on the BI-AAQ have shown internal consistency, 3-week test-retest reliability, and construct validity among primarily female U.S. undergraduates and U.S. community women (Sandoz et al., 2013; Timko, Juarascio, Martin, Faherty, & Kalodner, 2014). In the present study, Cronbach's alpha was .97.

2.2.5. Body appreciation

The Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015) comprises 10 items (e.g., “I feel good about my body”) rated from 1 = *never* to 5 = *always*. BAS-2 scores are averaged with higher scores indicating higher levels of body appreciation. Scores on the BAS-2 have shown internal consistency, 3-week test-retest reliability, and construct validity in U.S. female community and undergraduate samples (Tylka & Wood-Barcalow, 2015). Cronbach's alpha in the current sample was .97.

2.2.6. Demographic items

Participants reported their age, ethnic background, highest completed education level, height (in inches), and weight (in pounds). Self-reported height and weight were used to calculate BMI.

2.3. Statistical Analyses

Means, standard deviations (SDs), and bivariate correlations were obtained to examine the associations between all study variables (see Table 1). Next, a moderated serial mediation structural equation model was assessed by means of maximum likelihood path analysis (Muthén, Muthén, & Asparouhov, 2017) in Mplus version 7.31. A set of indices were used to determine the fit of the model: Chi-square (χ^2), the root mean square error of approximation (RMSEA) with 90% confidence intervals, the comparative fit index (CFI), the Tucker-Lewis index (TLI), and the standardized root mean square residual (SRMR) index. Acceptable model fit is indicated by a non-significant χ^2 value, a RMSEA value < .08, CFI and TLI values > .95, and a SRMR value < .05 (Hu & Bentler, 1999). Mod-

ification indices were requested to inspect whether the model fit would be improved by including additional, theoretically plausible, pathways (Kline, 2015).

The moderated serial mediation model was quantified in order to determine whether body image flexibility mediated the effects of appearance comparisons on eating disorder psychopathology and body appreciation and whether body image flexibility and body appreciation serially mediated the relationship between appearance comparisons and eating disorder psychopathology. Moreover, this model was utilized to test whether self-compassion moderated the association between appearance comparisons and body image flexibility as well as the potential simple and serial mediation effects. To identify the nature of these associations, conditional effects at low (mean – 1 SD), medium (mean), and high (mean + 1 SD) values of self-compassion were inspected. The model was tested using 95% bias-corrected confidence intervals (CIs) based on 5000 bootstrap samples. Significance is demonstrated if the case zero is not contained in the CIs (Muthén et al., 2017). All variables were standardized prior to path analysis.

3. Results

3.1. Data Screening and Descriptive Information

Prior to analysis, data were screened for missing data points, outliers, and violations of assumptions for the planned analysis. Any other items than height and weight were required to continue with the questionnaire. Even though answers to height and weight questions were not mandatory, all completers answered these questions. Therefore, removing non-completers created a data set with no missing data points on any measure. A one-way ANOVA was conducted to test whether completers and non-completers differed in age. No significant difference in age emerged, $F(1, 254) = 0.63$, $p = .43$. Outliers were defined as values that were ± 3 SDs above or below the group mean. One univariate outlier for BMI was detected. Four multivariate outliers were detected via Mahalanobis distance. Since removing outliers did not show differences in significance for any test, results for the full sample were reported. All assumptions for the planned analysis were met.

Table 1 provides means, SDs, and intercorrelations for all study variables. Appearance comparisons were positively correlated with eating disorder psychopathology and negatively correlated with body image flexibility and body appreciation. Self-compassion was inversely associated with appearance comparisons and eating disorder psychopathology and positively associated with body

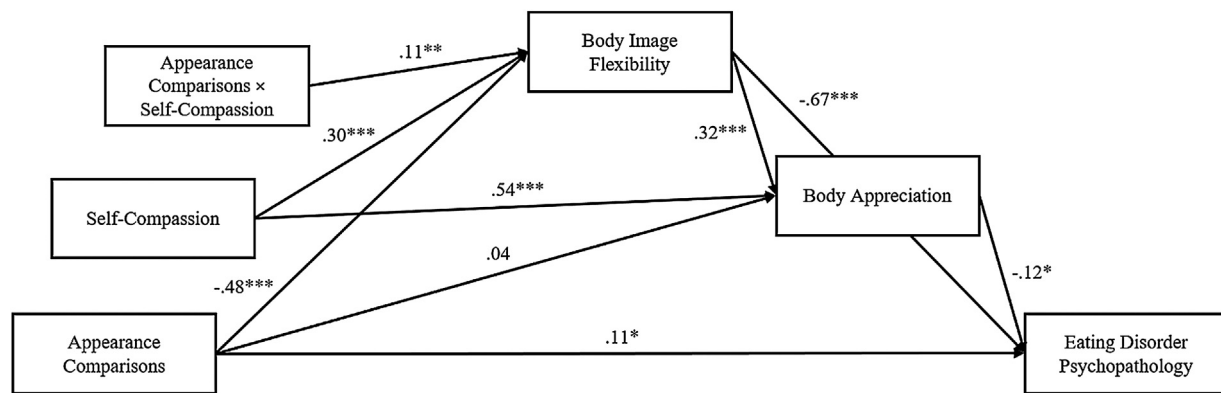


Fig. 1. Path Coefficients for the Moderated Serial Mediation Model.

Note. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed); coefficients are standardized; for simplification reasons, control variables are not reported in the figure.

appreciation. Body image flexibility correlated negatively with eating disorder psychopathology and positively with body appreciation. All correlations were in the anticipated directions. Further, BMI was positively related to eating disorder psychopathology and negatively related to body image flexibility and body appreciation, while age was negatively related to appearance comparisons and positively related to self-compassion, body image flexibility, and body appreciation. On these grounds, BMI and age were included as covariates.

3.2. Test of the Structural Model

The initially tested model showed a non-acceptable fit to the data, χ^2 (4, $N = 250$) = 96.28, $p < .001$, RMSEA (90% CI .25; .36) = .304, CFI = 0.88, TLI = 0.47, SRMR = .054. Modification indices (MIs) indicated that including a direct pathway between self-compassion and body appreciation (MI = 79.13) would improve the model fit. On the basis of past research supporting this association (e.g., Andrew et al., 2016; Kelly & Stephen, 2016; Wasylikiw, MacKinnon, & MacLellan, 2012), this modification was incorporated. The revised model, χ^2 (3, $N = 250$) = 1.14, $p = .76$, RMSEA (90% CI .00; .07) < .001, CFI = 1.00, TLI = 1.00, SRMR = .005, revealed a significantly better fit to the data than the original model, $\chi^2_{\text{difference}}$ (1, $N = 250$) = 95.14, $p < .001$.

In order to test whether the revised model, assuming that women who frequently engage in appearance comparisons show lower levels of body image flexibility, is superior to a model assuming that women lower in body image flexibility are prone to making more appearance comparisons, these two models were evaluated against each other. The alternative model with a direct pathway from body image flexibility to appearance comparisons, χ^2 (7, $N = 250$) = 32.64, $p < .001$, RMSEA (90% CI .08; .16) = .121, CFI = 0.97, TLI = 0.90, SRMR = .042, showed a significantly worse fit to the data than the revised model with a direct pathway from appearance comparisons to body image flexibility, $\chi^2_{\text{difference}}$ (4, $N = 250$) = 31.50, $p < .001$.

Results of the final model are displayed in Fig. 1 and Table 2. The model explained 60% of the variance in body image flexibility, 75% of the variance in eating disorder psychopathology, and 59% of the variance in body appreciation. As expected, the negative pathways from appearance comparisons to body image flexibility, $\beta = -.48$, $p < .001$, 95% CI [-.56; -.39], and from body image flexibility to eating disorder psychopathology, $\beta = -.67$, $p < .001$, 95% CI [-.76; -.58], as well as the positive pathway from body image flexibility to body appreciation, $\beta = .32$, $p < .001$, 95% CI [.20; .43], were significant. The direct pathway from appearance comparisons to eating disorder psychopathology, $\beta = .11$, $p = .01$, 95% CI [.04; .17],

Table 2

Path Coefficients Estimating Predictor–Mediator and Predictor–Criterion Associations.

Predictor	β	SE	95% CI
Mediator: Body Image Flexibility			
Appearance Comparisons	-.48***	.05	-.56; -.39
Self-Compassion	.30***	.05	.23; .39
Appearance Comparisons \times Self-Compassion	.11*	.05	.03; .18
BMI	-.32***	.05	-.40; -.24
Age	.06	.04	-.01; .12
$R^2 = .60$			
Mediator: Body Appreciation			
Appearance Comparisons	.04	.06	-.08; .14
Body Image Flexibility	.32***	.07	.20; .43
Self-Compassion	.54***	.06	.44; .63
BMI	-.13*	.06	-.22; -.04
Age	-.07	.04	-.13; .00
$R^2 = .59$			
Criterion: Eating Disorder Psychopathology			
Appearance Comparisons	.11*	.04	.04; .17
Body Image Flexibility	-.67***	.06	-.76; -.58
Body Appreciation	-.12*	.05	-.19; -.04
BMI	.14***	.04	.08; .21
Age	.08**	.03	.03; .13
$R^2 = .75$			

Note. $N = 250$; * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed); coefficients are standardized.

was significant, while the direct pathway from appearance comparisons to body appreciation, $\beta = .04$, $p = .54$, 95% CI [-.07; .14], was non-significant. Furthermore, the positive pathways from self-compassion to body image flexibility, $\beta = .30$, $p < .001$, 95% CI [.23; .40], and to body appreciation, $\beta = .54$, $p < .001$, 95% CI [.44; .63], were significant. Lastly, body appreciation was negatively associated with eating disorder psychopathology, $\beta = -.12$, $p = .01$, 95% CI [-.19; -.04].

3.3. Tests of Moderated Mediation and Moderated Serial Mediation

First, we examined whether body image flexibility and body appreciation function as mediators in the present model. As expected, tests of indirect effects suggest that appearance comparisons were positively associated with eating disorder psychopathology via body image flexibility, $\beta = .32$, $p < .001$, 95% CI [.26; .40], and negatively associated with body appreciation via body image flexibility, $\beta = -.15$, $p < .001$, 95% CI [-.22; -.09]. Further, the indirect effect of appearance comparisons on eating disorder psychopathology via body image flexibility and body appreciation (serial mediation) was significant, $\beta = .02$, $p = .04$, 95% CI [.01; .04]. Note that the indirect effect of appearance comparisons on eating

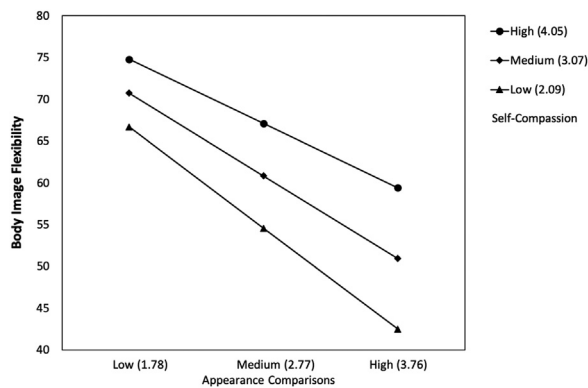


Fig. 2. Conditional Effects of Low (Mean – 1 SD), Medium (Mean), and High (Mean + 1 SD) Levels of Appearance Comparisons on Body Image Flexibility at Low (Mean – 1 SD), Medium (Mean), and High (Mean + 1 SD) Levels of Self-Compassion.

disorder psychopathology via body appreciation was not examined because the non-significant direct effect from appearance comparisons to body appreciation precluded mediation.

To assess the influence of self-compassion on body image flexibility and the respective downstream associations, we examined whether self-compassion moderated the direct effect of appearance comparisons on body image flexibility, the simple mediation effects on eating disorder psychopathology and body appreciation, and the serial mediation effect. In accordance with our hypotheses, the relationship between appearance comparisons and body image flexibility was moderated by self-compassion, as indicated by the significant interaction of appearance comparisons and self-compassion, $\beta = .11$, $p = .02$, 95% CI [.03; .18]. Conditional effects of appearance comparisons on body image flexibility were significant for low (mean – 1 SD) self-compassion, $\beta = -.59$, $p < .001$, 95% CI [–.72; –.44], medium (mean) self-compassion, $\beta = -.48$, $p < .001$, 95% CI [–.56; –.39], and high (mean + 1 SD) self-compassion, $\beta = -.37$, $p < .001$, 95% CI [–.46; –.29] (see Fig. 2). As indicated by the diverging coefficients, the negative association between appearance comparisons and body image flexibility was weakest at high, compared to medium and low, self-compassion.

Further, the positive indirect effect of appearance comparisons on eating disorder psychopathology via body image flexibility was moderated by self-compassion, $\beta = -.07$, $p = .02$, 95% CI [–.12; –.02]. More specifically, the mediation effect was significant at low, $\beta = .40$, $p < .001$, 95% CI [.30; .50], medium, $\beta = .32$, $p < .001$, 95% CI [.26; .40], and high, $\beta = .25$, $p < .001$, 95% CI [.19; .32], levels of self-compassion. Moreover, the negative indirect effect of appearance comparisons on body appreciation via body image flexibility did depend on self-compassion, $\beta = .03$, $p = .04$, 95% CI [.01; .07]. Conditional effects were significant when levels of self-compassion were low, $\beta = -.19$, $p < .001$, 95% CI [–.28; –.11], medium, $\beta = -.15$, $p < .001$, 95% CI [–.22; –.09], and high, $\beta = -.12$, $p < .001$, 95% CI [–.18; –.07]. Thus, both indirect effects were attenuated most for women high, compared to medium and low, in self-compassion.

Unexpectedly, self-compassion was not found to moderate the positive indirect effect of appearance comparisons on eating disorder psychopathology via body image flexibility and body appreciation, $\beta = -.00$, $p = .13$, 95% CI [–.01; .00]. Conditional effects were significant at low, $\beta = .02$, $p = .04$, 95% CI [.01; .03], medium, $\beta = .02$, $p = .04$, 95% CI [.01; .03], and high, $\beta = .01$, $p = .04$, 95% CI [–.01; .02], self-compassion.

In follow-up analyses, subscales of the self-compassion measure were utilized to identify whether certain components of self-compassion drove the effects. For this purpose, six separate models with one self-compassion component as the moderator and

identical pathways to those of the final model were inspected.¹ Results of these analyses are displayed in Table 3. Moderation effects of the relationship between appearance comparisons and body image flexibility were non-significant for mindfulness, $\beta = .05$, $p = .26$, 95% CI [–.03; .12], marginally significant for isolation, $\beta = -.08$, $p = .06$, 95% CI [–.15; .01], and significant for all other self-compassion components (see Table 3). The same pattern of results emerged for moderated mediation effects on eating disorder psychopathology and body appreciation. Moderated serial mediation effects were non-significant for all self-compassion components. Moreover, conditional direct and indirect effects were significant at low, medium, and high levels of the particular self-compassion component for all components.

4. Discussion

The present study examined the roles of body image flexibility, body appreciation, and self-compassion in the connection between appearance comparisons and eating disorder psychopathology. In line with previous studies (e.g., Andrew et al., 2016; Arigo et al., 2014; Homan & Tylka, 2015; van den Berg et al., 2002), this study showed that appearance comparisons were positively related to eating disorder psychopathology and negatively related to body appreciation. Results were also consistent with past research (Ferreira et al., 2016) in showing that appearance comparisons were associated with the reduced ability to accept aversive thoughts regarding the body and engage in valued action when having concerns about body size, weight, or shape. Further, self-compassion was linked to lower eating pathology and greater body appreciation and body image flexibility. The findings align with those of Braun et al. (2016), who, in their systematic review on self-compassion, body image, and eating disorder psychopathology, conclude that a kind attitude towards oneself may be advantageous in the domain of body image and eating.

4.1. Body Image Flexibility and Body Appreciation as Mediators

In support of our hypotheses, results revealed that body image flexibility mediated the positive relationship between appearance comparisons and eating disorder psychopathology and the inverse relationship between appearance comparisons and body appreciation. Our results align with Webb et al.'s (2014) understanding of body image flexibility as an adaptive self-regulatory mechanism and extend cognitive-behavioral models of body image (i.e., Cash, 2011; Webb et al., 2014), by showing that low levels of body image flexibility may explain the associations between appearance comparison processes and eating pathology as well as body appreciation.

The inverse path between body appreciation and eating disorder psychopathology in this model is consistent with previous research (Gillen, 2015; Tylka & Wood-Barcalow, 2015) and connotes that low levels of body appreciation may contribute to the use of maladaptive eating behaviors. Evidence of serial mediation suggests that the relationship between women's tendency to frequently engage in appearance comparisons and eating pathology may be attributable to an inflexible response style when thinking

¹ All models showed acceptable fit to the data: Self-kindness, $\chi^2 (3, N = 250) = 3.30$, $p = .35$, RMSEA (90% CI .00; .11) = .020, CFI = 1.00, TLI = 1.00, SRMR = .009, self-judgment, $\chi^2 (3, N = 250) = 1.28$, $p = .74$, RMSEA (90% CI .00; .08) < .001, CFI = 1.00, TLI = 1.00, SRMR = .004, common humanity, $\chi^2 (3, N = 250) = 6.47$, $p = .09$, RMSEA (90% CI .00; .14) = .068, CFI = 1.00, TLI = 0.97, SRMR = .013, isolation, $\chi^2 (3, N = 250) = 0.53$, $p = .91$, RMSEA (90% CI .00; .04) < .001, CFI = 1.00, TLI = 1.00, SRMR = .003, mindfulness, $\chi^2 (3, N = 250) = 5.11$, $p = .16$, RMSEA (90% CI .00; .13) = .053, CFI = 1.00, TLI = 0.98, SRMR = .011, over-identification, $\chi^2 (3, N = 250) = 1.56$, $p = .67$, RMSEA (90% CI .00; .08) < .001, CFI = 1.00, TLI = 0.98, SRMR = .008.

Table 3
Tests of Moderation, Moderated Mediation, and Moderated Serial Mediation with Conditional Effects for Self-Compassion Components.

Moderator	Moderation		Moderated Mediation				Moderated Serial Mediation	
			Mediator: Body Image Flexibility		Mediator: Body Image Flexibility		Mediator 1: Body Image Flexibility Mediator 2: Body Appreciation	
	Criterion: Body Image Flexibility		Criterion: Eating Disorder Psychopathology		Criterion: Body Appreciation		Criterion: Eating Disorder Psychopathology	
	β (SE)	95 % CI	β (SE)	95 % CI	β (SE)	95 % CI	β (SE)	95 % CI
Self-Kindness	.10(.04)**	.04; .17	-.07(.03)**	-.11; -.03	.04(.02)*	.01; .06	-.00(.00)	-.01; .00
Low	-.65(.07)***	-.75; -.53	.44(.05)***	.35; .53	-.22(.05)***	-.30; -.15	.03(.01)*	.01; .05
Medium	-.54(.05)***	-.62; -.47	.37(.04)***	.31; .44	-.19(.04)***	-.25; -.19	.02(.01)*	.01; .04
High	-.44(.05)***	-.52; -.36	.30(.04)***	.24; .37	-.15(.03)***	-.21; -.10	.02(.01)*	.01; .03
Self-Judgment	-.12(.05)*	-.19; -.04	.08(.03)*	.03; .13	-.04(.02)*	-.08; -.01	.01(.00)	.00; .01
Low	-.30(.06)***	-.40; -.21	.20(.04)***	.14; .20	-.10(.03)***	-.16; -.06	.01(.01)*	.01; .03
Medium	-.41(.06)***	-.51; -.31	.28(.04)***	.22; .36	-.14(.04)***	-.21; -.09	.02(.01)*	.01; .03
High	-.53(.09)***	-.67; -.38	.36(.06)***	.26; .46	-.18(.05)***	-.28; -.11	.02(.01)*	.01; .04
Common Humanity	.09(.04)*	.03; .15	-.06(.03)*	-.11; -.02	.04(.02)*	.01; .07	-.01(.00)	-.01; .00
Low	-.66(.05)***	-.75; -.57	.45(.05)***	.37; .53	-.31(.05)***	-.39; -.24	.04(.02)*	.01; .06
Medium	-.58(.04)***	-.65; -.51	.39(.04)***	.33; .46	-.27(.04)***	-.34; -.21	.03(.01)*	.01; .06
High	-.49(.06)***	-.58; -.39	.33(.05)***	.25; .41	-.23(.04)***	-.31; -.16	.03(.01)*	.01; .05
Isolation	-.08(.04)	-.15; -.01	.06(.03)	.01; .10	-.04(.02)	-.07; -.01	.00(.00)	.00; .01
Low	-.37(.06)***	-.47; -.28	.25(.04)***	.18; .32	-.16(.04)***	-.24; -.10	.02(.01)*	.01; .04
Medium	-.45(.06)***	-.54; -.35	.30(.04)***	.24; .38	-.20(.05)***	-.28; -.13	.02(.01)*	.01; .05
High	-.53(.09)***	-.67; -.39	.36(.06)***	.27; .46	-.23(.06)***	-.34; -.14	.03(.01)*	.01; .06
Mindfulness	.05(.04)	-.03; .12	-.03(.03)	-.08; .02	.02(.02)	-.01; .05	-.00(.00)	-.01; .00
Low	-.62(.08)***	-.73; -.49	.42(.06)***	.33; .51	-.26(.05)***	-.35; -.18	.03(.01)*	.01; .06
Medium	-.57(.05)***	-.64; -.49	.38(.04)***	.32; .46	-.24(.04)***	-.32; -.17	.03(.01)*	.01; .05
High	-.52(.05)***	-.60; -.43	.35(.04)***	.28; .42	-.22(.04)***	-.29; -.15	.03(.01)*	.01; .05
Over-Identification	-.10(.05)*	-.18; -.02	.07(.03)*	.02; .12	-.04(.02)*	-.08; -.01	.01(.00)	.00; .01
Low	-.36(.06)***	-.46; -.27	.24(.04)***	.18; .32	-.15(.04)***	-.21; -.09	.02(.01)*	.01; .03
Medium	-.46(.06)***	-.56; -.36	.31(.04)***	.24; .39	-.19(.05)***	-.27; -.12	.02(.01)*	.01; .04
High	-.57(.09)***	-.71; -.40	.38(.06)***	.28; .49	-.23(.06)***	-.33; -.14	.03(.01)*	.01; .05

Note. $N = 250$; low = mean $- 1$ SD; medium = mean; high = mean $+ 1$ SD; the predictor was appearance comparisons for all tests; * $p < .05$; ** $p < .01$; *** $p < .001$ (two-tailed); coefficients are standardized.

negatively about their body as well as lacking appreciation of their body. These findings help to expand theoretical frameworks (i.e., Cash, 2011; Webb et al., 2014) since they indicate that comparison processes may be connected to a complex sequencing of cognitive and behavioral self-regulatory coping strategies and provide preliminary insights on the role that positive body image might play in lowering eating disorder pathology.

4.2. Self-Compassion as Moderator

As expected, self-compassion moderated the association between appearance comparisons and body image flexibility, such that the positive relationship between appearance comparisons and eating disorder psychopathology via body image flexibility as well as the negative relationship between appearance comparisons and body appreciation via body image flexibility were weakened when women possessed high levels of self-compassion.

The finding that self-compassion weakened the relation between appearance comparisons and body image flexibility highlights self-compassion's potential protective role in cognitive processes related to low body image flexibility. In addition, this is the first study to provide support for the idea that the well-documented association between appearance comparisons and eating disorder psychopathology may be buffered by self-compassion's effect on body image flexibility. By demonstrating that the beneficial effect of self-compassion on body appreciation in the context of appearance comparisons is likely due to self-compassion's amplifying effect on body image flexibility, results complement the findings by Homan and Tylka (2015) and Siegel et al. (2020) and resolve inconsistencies around self-compassion's

beneficial impact on positive body image in the face of appearance comparisons (Modica, 2019; Rodgers et al., 2017).

Contrary to our hypotheses and previous research (Homan & Tylka, 2015; Kelly, Carter, & Borairi, 2014; Siegel et al., 2020), the indirect effects of appearance comparisons on eating disorder psychopathology and body appreciation via body image flexibility were not absent but only attenuated at high levels of self-compassion. In addition, the serial mediation effect of appearance comparisons on eating disorder psychopathology via body image flexibility and body appreciation was not significantly moderated by self-compassion. Both findings could be related to the small effect size for the moderation of self-compassion. However, past studies (Homan & Tylka, 2015; Kell, Carter et al., 2014; Siegel et al., 2020) have observed effect sizes in similar magnitude, which could be attributable to the unfamiliarity with self-compassion in Western culture (Homan & Tylka, 2015). Another explanation may be the very strong association between appearance comparisons and body image flexibility observed in the present study, which could indicate that the potential shielding effects of self-compassion may have certain limits.

Results of the follow-up analyses, which showed that the proposed relationships were not moderated by mindfulness but by all other self-compassion components, suggest that becoming aware of one's negative body-related thoughts may not be sufficient to buffer against frequent appearance comparisons. Instead, practicing self-kindness, recognizing common humanity, and avoiding self-judgment, isolation, and over-identification seem to be the active ingredients, protecting from eating pathology and low positive body image related to appearance comparisons. Nevertheless, mindfulness may constitute a prerequisite for the other self-

compassion components (e.g., awareness of negative thoughts may be required to face these with kindness; Neff & Dahm, 2015). Clearly, there is a need for continued investigation of which self-compassion aspects are most relevant for the development of positive body image and the prevention and treatment of eating disorders.

The current findings hold several implications for preventive and treatment efforts to mitigate the risk of eating disorders and poor body image. First, the mediating effects of body image flexibility tentatively suggest that cultivating body image flexibility could present an instrumental approach to managing appearance comparisons. Targeting how women relate to stressful internal events instead of aiming to reduce or eliminate appearance comparisons is likely to be the more promising strategy, especially since modern technologies such as social media platforms (e.g., Instagram) provided women with ample opportunities to engage in comparisons (Fardouly et al., 2015) and comparison processes may even occur automatically, outside conscious awareness (Want, 2009). Although promising, longitudinal and experimental investigations are clearly needed to confirm these assumptions.

Second, the moderating effects of self-compassion propose that building a compassionate stance towards the self in general may help women to more skillfully accept negative thoughts about the body and to continue engaging in value-consistent action despite experiencing aversive content. Thus, encouraging self-kindness and the perspective that everyone experiences disappointments and suffering, could provide means to adaptively manage dysfunctional cognitions regarding the body, to abstain from unhealthy eating practices, and above and beyond to engage in positive ways of treating the body. Indeed, evidence suggests that interventions for increasing self-compassion, including therapeutic approaches (e.g., Compassion Focused Therapy; Gilbert, 2010), are effective in reducing body image concerns and eating disorders (Albertson, Neff, & Dill-Shackleford, 2014; Gale, Gilbert, Read, & Goss, 2014; Kell, Carter et al., 2014; Kelly & Carter, 2015; Kelly, Vimalakanthan et al., 2014). However, more research investigating the effects of self-compassion interventions in subclinical populations is warranted (Steindl, Buchanan, Goss, & Allan, 2017). Additionally, the development of affordable interventions for improving self-compassion skills (e.g., online programs or smartphone apps) is necessary to improve accessibility (Linardon, Susanto, Tepper, & Fuller-Tyszkiewicz, 2020).

4.3. Limitations and Additional Future Research Directions

The results of this study should be interpreted in acknowledgment of several limitations that inform areas of future research. First, the cross-sectional and correlational design does not allow to draw conclusions about cause-and-effect relationships. Future research employing longitudinal and experimental designs is needed. For example, ecological momentary assessment methods (e.g., through daily diary) could clarify whether the proposed relationships hold true for real-life cognitions and behaviors. Further, it would be interesting to test whether self-compassion interventions are capable to protect from appearance comparisons and result in greater adaptive eating and body image coping.

Second, this study investigated a non-clinical sample of adult women. It is currently unclear whether the shown associations exist in girls and adolescent females as well as those who have been diagnosed with clinical-level eating disorders or body dysmorphic disorder. Replicating results for these target groups is important, given that it is particularly common for girls and adolescent women to compare their bodies (Warren, Schoen, & Shafer, 2010) and that appearance comparisons have been identified as a maintenance factor for eating pathology (Fairburn, 2008). Additionally, it would be interesting to explore whether the same associations hold true

for men, especially since appearance comparisons have as well been associated with lower body appreciation and greater disordered eating among men (Alleva, Paraskeva, Craddock, & Diedrichs, 2018; Halliwell & Harvey, 2006) and self-compassion has been found to buffer the relationship between body image concerns and eating pathology in men (Linardon et al., 2020). It should further be noted that the mean age of this sample ($M_{age} = 42.66$) is higher compared to most body image research samples. Potential reasons for this deviation could be that many body image studies utilize student samples, which have been found to be significantly younger than MTurk worker samples (Paolacci, Chandler, & Ipeirotis, 2010), and that older women might have been more willing or interested to participate in a survey on body and eating-related attitudes and behaviors.

A third limitation to this study pertains the psychometric properties of the utilized measures. The BI-AAQ as well as the SCS have been criticized for capturing the absence of body image flexibility and self-compassion, respectively, rather than the presence of these constructs (López et al., 2015; Webb, 2015).

An interesting direction for future research could be to explore whether body image flexibility also accounts for the negative outcomes related to alternative external and internal body image threats (e.g., exposure to idealized images, self-objectification, thin- and athletic-ideal internalization). Since the present results indicate that body image flexibility may serve as an intermediary process of disturbing internal experiences about the body and adaptive outcomes, future research could investigate whether a flexible approach towards disturbing thoughts about the body also explains the negative associations between appearance comparisons and additional adaptive outcomes, such as a more broad conceptualization of beauty, body pride, attunement (i.e., body responsiveness and mindful self-care), or intuitive eating, which have all been shown to correlate with body image flexibility (Rogers et al., 2018).

4.4. Conclusions

Frequently evaluating one's body against how other bodies look like may be related to less adaptive and more maladaptive strategies to cope with body- and eating-related distress. However, dysfunctional behaviors could be attributable to an avoidant approach when thinking negatively about the body as well as to low appreciation of one's body. Cultivating a general attitude of self-compassion may help women to accept distressing internal events about the body, which could protect them against harmful behaviors related to heightened appearance comparison tendencies. Though future experimental research is required, the findings highlight the potential value of targeting body image flexibility and self-compassion as factors for the prevention and treatment of eating disorders as well as the promotion of positive body image.

CRedit authorship contribution statement

Iris Perey: Conceptualization, Methodology, Formal analysis, Investigation, Writing - original draft. **Joerg Koenigstorfer:** Conceptualization, Methodology, Formal analysis, Writing - original draft, Supervision.

Declaration of Competing Interest

None.

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