Alcaraz-Ibáñez, M., Paterna, A., Griffiths, M.D. & Sicilia, A. (2020). Examining the role of social physique anxiety on the relationship between physical appearance comparisons and disordered eating symptoms among Spanish emerging adults. ***Scandinavian Journal of Psychology*****, DOI: 10.1111/sjop.12663**

Abstract

The present study extends previous research by examining the moderating/mediating role of social physique anxiety (SPA) on the relationship between physical appearance comparisons (PAC) and symptoms of disordered eating (DE) in adolescent population. A total of 555 emerging adults (59% women) ranging from 18-30 years of age (M = 21.34, SD = 2.80) were recruited from two public universities from Spain using a non-probabilistic sampling technique. Participants completed a self-reported questionnaire comprising the variables of research interest. Once the effects of sex (i.e., being men or women), age, body mass index, and depressive symptoms were controlled for, the results from bootstrapping cross-sectional regression analyses supported both the moderating and mediating effect of SPA on the relationship between PAC and DE. Sex did not moderate any of these relationships. From these findings it follows that incorporating strategies aimed at decreasing PAC and SPA may contribute to improved prevention efforts aimed at decreasing DE among Spanish emerging adults of both sexes.

Keywords: physical appearance; psychopathology; young adulthood, eating pathology; social comparison

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1. Introduction

Due to their increasing prevalence and associated socioeconomic burden, eating disorders are considered a public health concern worldwide (Crow, 2014; Samnaliev, Noh, Sonneville, & Austin, 2015; Smink, Van Hoeken, & Hoek, 2012). For instance, previous research conducted in Western countries (Alcaraz-Ibáñez & Sicilia, 2020; Alcaraz-Ibáñez, Sicilia, & Paterna, 2019) has reported high percentages of risk for an eating disorder among emerging adults (i.e., those that, aged between 18 and 30 years, are transitioning from late adolescence to their late twenties; Arnett, Žukauskiene, & Sugimura, 2014). A clear example of the latter is Spain, where risk figures of approximately 20% have been reported for this population Therefore, it is not surprising that a considerable amount of research has been devoted to explaining the aetiology of eating disorders in both their clinical and sub-clinical forms (i.e., disordered eating, DE) (Farstad, McGeown, & von Ranson, 2016; Lantz, Gaspar, DiTore, Piers, & Schaumberg, 2018; Schaefer & Thompson, 2018).

According to the tenets of Cognitive-behavioural models of body image, DE may emerge as a maladaptive strategy to cope with negative body-related cognitions and affects (Cash, 2012). In support of these theoretical proposals, empirical evidence has been found associating body-related cognitive processes such as physical appearance comparison (PAC) to DE (Alcaraz-Ibáñez, 2017; Alcaraz-Ibáñez, Sicilia, Díez-Fernández, & Paterna, 2020; Fitzsimmons-Craft, Harney, Brownstone, Higgins, & Bardone-Cone, 2012; Walker et al., 2015). Similarly, a body-related affective experience such as social physique anxiety (SPA; i.e., the distressed feelings experienced as a result of believing that the own body could be negatively evaluated by others; Hart, Leary, & Rejeski, 1989) has been also consistently associated with DE (Alcaraz-Ibáñez & Sicilia, 2020; Alcaraz-Ibáñez et al., 2020; Fitzsimmons-Craft, Harney, et al., 2012; Lanfranchi, Maïano, Morin, & Therme, 2015).

Different mechanisms of influence have been proposed to explain the relationship between PAC/SPA and DE. For instance, findings from a study conducted among young adult women suggest that these variables may exert a synergistic/moderating effect on DE or, in other words, that the positive relationship between one of these two variables and DE may increase in the presence of high levels in the other (Fitzsimmons-Craft, Harney, et al., 2012). Findings from another study conducted among an adolescent sample (aged between 12-17) examined the plausibility of both moderation and mediation effects, but only found support for the latter (Alcaraz-Ibáñez et al., 2020). However, the research conducted by Alcaraz-Ibáñez et al. (2020) was limited to adolescent participants and does not allow the generalization of the mediating effect of SPA on the relationship between PAC and DE to other populations particularly sensitive to experience both body-related concerns and DE. A clear example of the latter would be emerging adults (Shagar, Harris, Boddy, & Donovan, 2017). This limitation is important in the light of evidence suggesting that the relationship between subjective experiences of the body and their potential outcomes may not occur equally across all developmental stages (Patalay, Sharpe, & Wolpert, 2015; Sharpe et al., 2017). Providing deeper insight into the influencing mechanisms of PAC and SPA on DE among emerging adults could contribute to a better understanding of the aetiology of this potential disorder and, consequently, improve prevention and intervention efforts aimed at reducing its prevalence in this population group.

The present study examined the moderating and mediating role of SPA on the relationship between PAC and DE symptoms in a sample of emerging adults of both sexes. By doing this, the present study extends previous research that addressed this issue in adolescent population (Alcaraz-Ibáñez et al., 2020). On the basis of the results of previous studies (Alcaraz-Ibáñez et al., 2020; Fitzsimmons-Craft, Harney, et al., 2012), it was hypothesized that both PAC and SPA would be positively related to DE symptoms. In

addition, the hypothesized relationships were expected to emerge after controlling for several variables of relevance in terms of eating disorders' aetiology such as sex, age, and body mass index (BMI) (Alcaraz-Ibáñez, 2017; Alcaraz-Ibáñez et al., 2020; Ferreiro, Seoane, & Senra, 2012; Walker et al., 2015). In view of evidence suggesting that eating pathology may act as mechanism that reduces negative mood that characterizes depression, the effect of depressive symptoms were also controlled for (Puccio, Fuller-Tyszkiewicz, Ong, & Krug, 2016). Given evidence supporting both the moderation (Fitzsimmons-Craft, Harney, et al., 2012) and the mediation mechanisms (Alcaraz-Ibáñez et al., 2020), no specific hypothesis favouring one of these effects was posited. In absence of evidence in support of the dimensionality, reliability, and invariance across sex of the Spanish version of the PACS-R in Spanish emerging adults, examining these issues was considered as a preliminary objective of the present study.

2. Method

2.1. Participants

Using a non-probabilistic sampling technique, an initial sample of 586 undergraduate students from two public urban area universities from southern Spain were invited to participate in the study. Geographical proximity was the only criterion used in the selection of these two centres. Participants were subsequently excluded if they did not provide their informed consent (n=12) or if they were: (a) not emerging adults (Arnett et al., 2014), that is, younger than 18 or older than 30 years of age (n=14), or (b) currently diagnosed with a psychiatric disorder (n=5). After applying these exclusion criteria, 555 participants (58.9% women; M_{age} = 21.34 years, SD_{age} = 2.80) with a self-reported BMIs that ranged from 15.24 to 36.33 kg/m^2 (M = 22.97, SD = 3.36) were included in the analyses. The participants identified themselves as being White/Caucasian (92%), Maghrebi (4%), Latin (1%), Black (1%), Asian (1%) and Gypsy (1%).

2.2. Measures

2.2.1. Physical appearance comparison. This was assessed using the Spanish translation (Alcaraz-Ibáñez et al., 2020) of the Physical Appearance Comparison Scale-Revised (PACS-R; Schaefer & Thompson, 2014). This instrument comprises 11 items (e.g. *"When I'm out in public, I compare my body size to the body size of others"*) rated on a five-point scale ranging from 0 (*never*) to 4 (*always*), with higher scores representing more frequent engagement in physical appearance comparisons. Evidence in support of the validity and reliability of this instrument's scores among male and female Spanish adolescents has previously been found (Alcaraz-Ibáñez et al., 2020).

2.2.2. Social physique anxiety. This was assessed using the Spanish translation (Sáenz-Alvarez, Sicilia, González-Cutre, & Ferriz, 2013) of the Social Physique Anxiety Scale (SPAS; Motl & Conroy, 2000). This instrument comprises seven items (e.g. *"In the presence of others, I feel apprehensive about my physique/figure"*) rated on a five-point scale from 1 (*never*) to 5 (*always*), with higher scores representing more frequent experiences of social physique-anxiety. Evidence in support of the validity and reliability of this instrument's scores among male and female Spanish young adults has previously been found (Alcaraz-Ibáñez & Sicilia, 2020).

2.2.3. Depressive symptoms. This was assessed with the Spanish version of the Depression sub-scale from the Brief Symptom Inventory-18 (BSI-18; Derogatis, 2000). This instrument comprises six items (e.g., *"Feeling blue"*) that, rated on a five-point scale from 0 (*not at all*) to 4 (*extremely*), assess distress experienced over the previous seven days as a result of depressive symptoms such as apathy, sadness, self-deprecation, anhedonia, loss of hope, and suicidal ideation. Evidence in support of the validity and reliability of this instrument's scores among male and female Spanish young adults has previously been found (Pereda, Forns, & Peró, 2007).

2.2.4. Symptoms of disordered eating. These were assessed using the Spanish version of the SCOFF questionnaire (Morgan, Reid, & Lacey, 1999), validated among adolescents (Caamaño, Aguiar, López-Otero, & Takkouche, 2002). Scored dichotomously (No = 0, Yes = 1), the five items comprising this instrument reflect some of the key characteristics of anorexia and bulimia nervosa (e.g., loss of eating control or food intrusive thoughts). The instrument has previously been employed to provide a continuous score (i.e., higher scores suggest an increased risk of DE) among male and female Spanish young adults (Alcaraz-Ibáñez & Sicilia, 2020; Garrido-Miguel et al., 2017).

2.2.5. Demographics. Participants reported their sex, ethnicity, age, height (in cm), and weight (kg), the latter two being employed to calculate BMI (kg/m^2).

2.3. Procedure

Participants were recruited in classroom settings by one member of the research team. After being briefly informed about the study's contents (body/eating attitudes) and the anonymous nature of their participation, those students who provided their informed consent (98%) completed a paper-and-pencil questionnaire. Two different counterbalanced arrangements were used when presenting the measures included in the questionnaire. Participants were asked to refrain from discussing and sharing their answers. No economic or academic inducement were offered in exchange for participation. After completing the task, the participants were debriefed and thanked. Data were collected from mid-2018 to late 2019. The study was approved by the first author's university ethics committee.

2.4. Statistical analyses

2.4.1. Preliminary analyses. First, both the factor structure of the PACS-R and the invariant nature of its scores across sex were examined. Similarly to previous research among Spanish adolescents examining the factor structure and the invariant nature of the PACS-R scores across sex, these issues were examined utilizing exploratory structural equation

125 modelling (ESEM) (Marsh, Morin, Parker & Kaur, 2014) in Mplus 7 (Muthén & Muthén,
126 1998-2015). According to the ordered categorical nature of the variable under consideration,
127 these ESEM models were tested employing the weighted least squares mean- and variance-
128 adjusted (WLSMV) estimation method (Li, 2015). Goodness-of-fit was evaluated using the
129 Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA).
130 Values above .95 or between .90-.95 (CFI) and below .06 or .10 (RMSEA), respectively,
131 indicate excellent or marginally acceptable fit (West, Taylor, & Wu, 2012). In multigroup
132 invariance analyses, statistically significant differences ($p < .05$) between nested models
133 (M0= equivalent factor structure; M1= equivalent factor loadings and item thresholds) in the
134 DIFFTEST implemented in Mplus 7 (Muthén & Muthén, 1998-2015) were considered as
135 indicative of non-invariance. Following this, values of composite reliability (ρ) for the
136 psychometric instruments were obtained using a CFA technique and the weighted least
137 squares mean- and variance-adjusted (WLSMV) estimation method in Mplus 7 (Muthén &
138 Muthén, 1998-2015). This method have been found to provide robust standard errors to the
139 absence of normality with polytomous ordinal data (Li, 2015). Next, plausible composite
140 scores for the assessed constructs were obtained (Asparouhov & Muthén, 2010) using Mplus
141 7, these being employed in subsequent analyses. Missing data (less than 1%) were handled
142 using WLSMV (in the CFA) and Bayesian [is there a word missing here? Shouldn't it be
143 'Bayesian [something]'?) (when estimating the plausible composite scores) estimation
144 methods of Mplus 7. Finally, descriptive statistics, bivariate correlations, and sex differences
145 across study variables were obtained and interpreted in terms of *d* effect size (Cohen, 1988).

146 **2.4.2. Main analyses.** As proposed in the study to be replicated (Alcaraz-Ibáñez et
147 al., 2020), the relationships of interest were examined using the following PROCESS macro
148 for SPSS models (Hayes, 2013): Model-1 (for examining the effect of the interaction between
149 PAC × SPA on DE), Model-3 (for examining the effect of the interaction between PAC ×

SPA × Sex on DE), Model-4 (for examining the mediating sequence PAC→SPA→DE), and Model-59 (for examining the moderating effect of sex on this mediated relationship). In these analyses, the associations under investigation are considered statistically significant when the 95% confidence interval (CI) obtained from applying a bias-corrected and accelerated bootstrapping technique does not contain zero. The applied bootstrapping technique does not require meeting assumptions such as homoscedasticity or residual normality (Hayes, 2013). Before conducting the described regression analyses, all continuous variables were standardized. Consequently, regression coefficients (β) are shown in their standardized form. Age, sex, BMI, and depressive symptoms were introduced as covariates.

3. Results

3.1. Preliminary Analyses

The inter-correlation of the items within the PACS-R ranged from .66 to .86 both in men and women. Item factor loadings for the tested factorial models segmented by sex are shown in Table 1. The results of the ESEM models showed slightly improved goodness-of-fit indices for a two-factor over a one-factor solution (see Table 2). Modification indices suggested that model fit could be improved by correlating the error terms of Items 7 and 9. In light of this finding, and consistent with the proposal by Alcaraz-Ibáñez et al. (2020), a third alternative one-dimensional model in which the error terms of Items 7-9 were allowed to freely correlate was also tested. Goodness-of-fit indices for this third factorial model were shown to be acceptable among the men' and women' subsamples. The results of the DIFFTEST showed significant differences between M0 and M1 between sex groups (p = .002). The modification indices values suggested that the model fit could be improved by freeing the constraints across threshold groups 1 and 2 of Item 6. After freeing the constraints associated to these parameters, the DIFFTEST results showed non-significant differences between M0 and M1 (p = .089). The percentage of freed parameters (i.e., 5%) was

significantly below the 20% maximum proposed as acceptable when examining partial measurement invariance (Dimitrov, 2010).

Descriptive statistics, bivariate correlations, composite reliability, and sex differences across study variables are shown in Table 3. As previously reported (Sáenz-Alvarez et al., 2013), a weak factor loading was found (.09 for girls and -.07 for boys) for the only reverse-worded item of the SPAS (Item 5). Therefore, and proceeding similarly to previous studies (Alcaraz-Ibáñez & Sicilia, 2020; Alcaraz-Ibáñez et al., 2020), Item 5 was excluded from further analyses. The scores for depressive symptoms, PAC, SPA, and DE symptoms were below the mid-point of the scales. Age was weakly and negatively correlated with DE symptoms. The remaining variables were moderately-to-strongly correlated with DE symptoms, the sign of these relationships being positive. The aforementioned pattern of correlations was observed both for men and women. Weak-to-small-sized sex differences favouring women were found for all study variables except for the BMI, the latter being a variable in which men showed slightly higher scores than women.

3.2. Main Analyses

The results from the first tested model showed that the interaction between PAC and SPA (β = .037, SE = .015, 95% CI = .006, .065) significantly contributed to explaining symptoms DE symptoms (ΔR^2= .002, F [1, 547] = 5.560, p = .018). More specifically, the relationship between PAC and DE symptoms was found to be slightly lower at low (β = .175, SE = .037, 95% CI = .102, .247) than high (β = .246, SE = .035, 95% CI = .177, .314) levels of SPA. Additionally, the results from the second tested model revealed that a triple interaction (i.e., PAC × SPA × Sex) was not plausible (β = -.030, SE = .032, 95% CI = -.092, .033). The results from the third tested model showed the relationship between PAC and DE to be positively mediated by SPA (see Table 4). The results from the fourth and final model tested model showed that the relationships under investigation in the mediation model were

not moderated by sex. This was the case for the relationships between PAC and SPA (β = .026, SE = .052, 95% CI = -.076, .127), SPA and DE (β = .029, SE = .068, 95% CI = -.104, .162), and PAC and DE (β = -.091, SE = .060, 95% CI = -.224 to .042). Additionally, the CI of the moderated mediation index (i.e., the difference between the indirect effects of PAC on DE via SPA for men and women) included zero (β = .032, SE = .052, 95% CI = -.069, .132), suggesting that no moderation by sex of the indirect effect was plausible.

4. Discussion

The present study sought to replicate findings among a sample of adolescents concerning the relationship between PAC, SPA, and DE symptoms reported by Alcaraz-Ibáñez et al. (2020) among a sample of emerging adults. Overall, findings from the present study contribute to literature by providing evidence suggesting that two body-related variables (i.e., PAC and SPA) may play a complementary role in explaining DE symptoms not only among adolescents of both sexes (Alcaraz-Ibáñez et al., 2020) or women in their young adulthood (Fitzsimmons-Craft, Harney, et al., 2012) but also among emerging adults undergraduate students. However, as discussed below, the obtained findings do not provide evidence that clearly supports one of the two potential mechanisms of influence (i.e., moderation and mediation) against the other.

In relation to the mediating effect of SPA on the relationship between PAC and DE, findings from the present study were largely consistent with those from the study replicated (Alcaraz-Ibáñez et al., 2020), in particular, because the presence of this effect on both sexes was clearly supported in both studies. However, these findings slightly differ from those reported by Alcaraz-Ibáñez et al. (2020). More specifically, because while similar in size (i.e., .037 vs. .027), this interaction effect was found to be statistically significant in the present study but not in the study by Alcaraz-Ibáñez et al. (2020). Furthermore, the findings from the present study were aligned with those supporting this same significant interaction

effect among a sample of young women in another study (Fitzsimmons-Craft, Harney, et al., 2012). In addition, the findings here expand on this previous study (Fitzsimmons-Craft, Harney, et al., 2012) by suggesting that the moderating effect of SPA on the relationship between PAC and DE may be also present among undergraduate student men in emerging adulthood. Globally considered, these findings suggest that, and as highlighted by previous research (Alcaraz-Ibáñez & Sicilia, 2020), the potential mental-health related outcomes arising from negative subjective body experiences may occur among individuals of both sexes.

Several limitations of the present study merit comment. Firstly, the cross-sectional nature prevented us from establishing causality or the directionality among the examined variables. This is particularly relevant because mediation necessarily implies change over time (Hayes, 2013). Secondly, despite the multifaceted nature of body image-related cognitions and affects (Cash, 2012), those considered in the present study only referred to physical appearance. Furthermore, it has been suggested that considering social comparisons refers not only to physical appearance but, additionally, to behaviours with the potential to modify one's body (e.g., eating or exercise) may incrementally contribute to explain DE (Fitzsimmons-Craft & Bardone-Cone, 2014; Fitzsimmons-Craft, Bardone-Cone, & Harney, 2012). The latter may also apply to SPA experiences, in this case, considering not only physical appearance-related ones but also those that refer to other body features such as functionality (Alcaraz-Ibáñez, Sicilia, & Paterna, 2019). Finally, the sample examined in the present study comprised a convenience sample of non-clinical emerging adults. Therefore, generalizing the results obtained to other populations of interest (e.g., those clinically diagnosed with an eating disorder) is not possible.

Overall, findings from the present study inform cognitive-behavioural models of body image (Cash, 2012), suggesting that a cognitive process such as PAC and an affective

experience such as SPA interactively contribute to the risk of DE among Spanish undergraduate students in emerging adulthood. From these findings it follows that implementing strategies aimed at decreasing PAC and SPA (e.g., implementing public campaigns to raise awareness about the need to adopt a critical view on socially prescribed but largely unrealistic body ideals) may contribute to decreasing the risk of DE among this population. The findings from the present study indicate the need for further prospective research that, extending from adolescence to young adulthood and considering other body features beyond appearance and both healthy/clinical populations, may contribute to enhance the understanding of the role of social comparisons and SPA on eating pathologies.

References

Alcaraz-Ibáñez, M. (2017). Comparación social de la apariencia en contextos de ejercicio físico como variable predictora de los trastornos de la conducta alimentaria en adolescentes de ambos sexos [Social appearance comparison in exercise contexts as a predictor of eating disorder]. *Espiral: Cuadernos Del Profesorado*, *10*(21), 80–89. https://doi.org/10.25115/ecp.v10i21.1031

Alcaraz-Ibáñez, M., & Sicilia, A. (2020). Analysis of the dynamic relationship between social physique anxiety and depressive symptoms in young adults. *Journal of Applied Developmental Psychology*, *66*, 101085. https://doi.org/10.1016/j.appdev.2019.101085

Alcaraz-Ibáñez, M., Sicilia, Á., Díez-Fernández, D. M., & Paterna, A. (2020). Physical appearance comparisons and symptoms of disordered eating: The mediating role of social physique anxiety in Spanish adolescents. *Body Image*, *32*, 145–149. https://doi.org/10.1016/j.bodyim.2019.12.005

Alcaraz- Ibáñez, M., Sicilia, Á., & Paterna, A. (2019). Exploring the differentiated relationship between appearance and fitness- related social anxiety and the risk of eating disorders and depression in young adults. *Scandinavian Journal of Psychology*, *60*(6), 569–576. https://doi.org/10.1111/sjop.12584

Arnett, J. J., Žukauskiene, R., & Sugimura, K. (2014). The new life stage of emerging adulthood at ages 18-29 years: Implications for mental health. *The Lancet Psychiatry*, *1*(7), 569–576. https://doi.org/10.1016/S2215-0366(14)00080-7

Asparouhov, T., & Muthén, B. O. (2010). Plausible values for latent variables using Mplus. *Mplus Technical Report*. Retrieved from http://www.statmodel.com/download/Plausible.pdf

Cash, T. F. (2012). Cognitive-behavioral perspectives on body image. In T. F. Cash (Ed.), *Encyclopedia of Body Image and Human Appearance* (pp. 334–342). San Diego, CA:

Academic Press (Elsevier). https://doi.org/10.1016/B978-0-12-384925-0.00054-7

Crow, S. (2014). The economics of eating disorder treatment. *Current Psychiatry Reports*, *16*(7), 14–16. https://doi.org/10.1007/s11920-014-0454-z

Derogatis, L. R. (2000). *Brief Symptom Inventory 18*. Minneapolis, MN: NCS Pearson, Inc.

Dimitrov, D. M. (2010). Testing for factorial invariance in the context of construct validation. *Measurement and Evaluation in Counseling and Development*, *43*(2), 121–149. https://doi.org/10.1177/0748175610373459

Farstad, S. M., McGeown, L., & von Ranson, K. M. (2016). Eating Disorders and Personality, 2004-2016: A Systematic Review and Meta-analysis. *Clinical Psychology Review*, *46*, 2004–2016. https://doi.org/10.1016/j.cpr.2016.04.005

Ferreiro, F., Seoane, G., & Senra, C. (2012). Gender-related risk and protective factors for depressive symptoms and disordered eating in adolescence: A 4-year longitudinal study. *Journal of Youth and Adolescence*, *41*(5), 607–622. https://doi.org/10.1007/s10964-011-9718-7

Fitzsimmons-Craft, E. E., & Bardone-Cone, A. M. (2014). One-year temporal stability and predictive and incremental validity of the body, eating, and exercise comparison orientation measure (BEECOM) among college women. *Body Image*, *11*, 27–35. https://doi.org/10.1016/j.bodyim.2013.09.003

Fitzsimmons-Craft, E. E., Bardone-Cone, A. M., & Harney, M. B. (2012). Development and validation of the Body, Eating, and Exercise Comparison Orientation Measure (BEECOM) among college women. *Body Image*, *9*, 476–487. https://doi.org/10.1016/j.bodyim.2012.07.007

Fitzsimmons-Craft, E. E., Harney, M. B., Brownstone, L. M., Higgins, M. K., & Bardone-Cone, A. M. (2012). Examining social physique anxiety and disordered eating in college women. The roles of social comparison and body surveillance. *Appetite*, *59*(3), 796–805.

https://doi.org/10.1016/j.appet.2012.08.019

Garrido-Miguel, M., Torres-Costoso, A., Martínez-Andrés, M., Notario-Pacheco, B., Díez-Fernández, A., Álvarez-Bueno, C., … Martínez-Vizcaíno, V. (2017). The risk of eating disorders and bone health in young adults: the mediating role of body composition and fitness. *Eating and Weight Disorders*, 1–10. https://doi.org/10.1007/s40519-017-0458-x

Hart, E. A., Leary, M. R., & Rejeski, W. J. (1989). The measurement of social physique anxiety. *Journal of Sport and Exercise Psychology*, *11*(1), 94–104.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. New York, NY: Guilford Press.

Lanfranchi, M.-C., Maïano, C., Morin, A. J. S., & Therme, P. (2015). Social physique anxiety and disturbed eating attitudes and behaviors in adolescents: Moderating effects of sport, sport-related characteristics, and gender. *International Journal of Behavioral Medicine*, *22*(1), 149–160. https://doi.org/10.1007/s12529-014-9406-6

Lantz, E. L., Gaspar, M. E., DiTore, R., Piers, A. D., & Schaumberg, K. (2018). Conceptualizing body dissatisfaction in eating disorders within a self-discrepancy framework: A review of evidence. *Eating and Weight Disorders- Studies on Anorexia, Bulimia and Obesity*, *23*(3), 275–291. https://doi.org/10.1007/s40519-018-0483-4

Li, C.-H. (2015). Confirmatory factor analysis with ordinal data: Comparing robust maximum likelihood and diagonally weighted least squares. *Behavior Research Methods*, *48*, 936–949. https://doi.org/10.3758/s13428-015-0619-7

Marsh, H. W., Morin, A. J. S., Parker, P. D., & Kaur, G. (2014). Exploratory structural equation modeling: An integration of the best features of exploratory and confirmatory factor analysis. *Annual Review of Clinical Psychology*, *10*, 85–110. https://doi.org/10.1146/annurev-clinpsy-032813-153700

Morgan, J. F., Reid, F., & Lacey, J. H. (1999). The SCOFF questionnaire: Assessment of a

new screening tool for eating disorders. *BMJ*, *319*, 1467–1468. https://doi.org/10.1136/bmj.319.7223.1467

Motl, R. W., & Conroy, D. E. (2000). Validity and factorial invariance of the Social Physique Anxiety Scale. *Medicine and Science in Sports and Exercise*, *32*(5), 1007–1017. https://doi.org/10.1097/00005768-200005000-00020

Muthén, L. K., & Muthén, B. O. (n.d.). *Mplus version 7: User's guide* (7th ed.). Los Angeles, CA: Muthén & Muthén.

Patalay, P., Sharpe, H., & Wolpert, M. (2015). Internalising symptoms and body dissatisfaction: Untangling temporal precedence using cross-lagged models in two cohorts. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *56*(11), 1223–1230. https://doi.org/10.1111/jcpp.12415

Pereda, N., Forns, M., & Peró, M. (2007). Dimensional structure of the Brief Symptom Inventory with Spanish college students. *Psicothema*, *19*(4), 634–639.

Puccio, F., Fuller-Tyszkiewicz, M., Ong, D., & Krug, I. (2016). A systematic review and meta-analysis on the longitudinal relationship between eating pathology and depression. *International Journal of Eating Disorders*, *49*(5), 439–454. https://doi.org/10.1002/eat.22506

Sáenz-Alvarez, P., Sicilia, A., González-Cutre, D., & Ferriz, R. (2013). Psychometric properties of the Social Physique Anxiety Scale (SPAS-7) in Spanish adolescents. *The Spanish Journal of Psychology*, *16*(E86), 1–9. https://doi.org/10.1017/sjp.2013.86

Samnaliev, M., Noh, H. L., Sonneville, K. R., & Austin, S. B. (2015). The economic burden of eating disorders and related mental health comorbidities: An exploratory analysis using the U.S. Medical Expenditures Panel Survey. *Preventive Medicine Reports*, *2*, 32–34. https://doi.org/10.1016/j.pmedr.2014.12.002

Schaefer, L. M., & Thompson, J. K. (2014). The development and validation of the Physical

Appearance Comparison Scale-Revised (PACS-R). *Eating Behaviors*, *15*(2), 209–217. https://doi.org/10.1016/j.eatbeh.2014.01.001

Schaefer, L. M., & Thompson, J. K. (2018). Self-objectification and disordered eating: A meta-analysis. *International Journal of Eating Disorders*, *51*(6), 483–502. https://doi.org/10.1002/eat.22854

Shagar, P. S., Harris, N., Boddy, J., & Donovan, C. L. (2017). The relationship between body image concerns and weight-related behaviours of adolescents and emerging adults: A systematic review. *Behaviour Change*, *34*(4), 208–252. https://doi.org/10.1017/bec.2018.3

Sharpe, H., Patalay, P., Choo, T.-H., Wall, M., Mason, S. M., Goldschmidt, A. B., & Neumark-Sztainer, D. (2017). Bidirectional associations between body dissatisfaction and depressive symptoms from adolescence through early adulthood. *Development and Psychopathology*, *30*, 1447–1458. https://doi.org/10.1017/S0954579417001663

Smink, F. R. E., Van Hoeken, D., & Hoek, H. W. (2012). Epidemiology of eating disorders: Incidence, prevalence and mortality rates. *Current Psychiatry Reports*, *14*(4), 406–414. https://doi.org/10.1007/s11920-012-0282-y

Walker, M., Thornton, L., De Choudhury, M., Teevan, J., Bulik, C. M., Levinson, C. A., & Zerwas, S. (2015). Facebook use and disordered eating in college-aged women. *Journal of Adolescent Health*, *57*(2), 157–163. https://doi.org/10.1016/j.jadohealth.2015.04.026

West, S. G., Taylor, A. B., & Wu, W. (2012). Model fit and model selection in structural equation modeling. In R. H. Hoyle (Ed.), *Handbook of Structural Equation Modeling* (pp. 209–231). New York, NY: Guilford.

Table 1

Item Factor Loadings for tested Factorial Models across Sex

	Women (n = 327)				Men (n = 228)			
		2F				2F		
Item	1F	F1	F2	1Fc	1F	F1	F2	1Fc
1	.91	.95	-.03	.91	.86	.83	.25	.87
2	.94	.95	.00	.94	.89	.84	.28	.89
3	.95	.93	.03	.95	.90	.83	.33	.90
4	.93	.45	.53	.93	.83	.89	.06	.89
5	.87	.26	.64	.88	.87	.84	-.08	.83
6	.84	.25	.63	.85	.87	.88	-.01	.87
7	.92	-.13	1.06	.90	.89	.90	-.10	.86
8	.95	.59	.40	.95	.96	.96	.00	.96
9	.89	.00	.91	.86	.87	.89	-.14	.84
10	.93	.21	.75	.93	.83	.88	-.31	.83
11	.83	.38	.48	.83	.75	.74	.08	.75

Note. 1F = one-factor; 2F =two-factor. In the model labelled 1Fc, the error terms of Items 7 and 9 were allowed to correlate freely, the values of such correlations being r = .53 (girls), r = .45 (boys). In models labelled 2F (i.e., two-factor ESEM models), the correlations between factors were r = .86 (women), r = .09 (men).

Table 2

Goodness-of-fit Indices for Tested Models and Invariance across Sex

Model	CFI	RMSEA (90% CI)	χ^2	*Df*	$\Delta\chi^2$ (Δdf)	*DIFFTEST p-value*
Women 1F	.990	.103 (.088, .117)	195.254	44		
Women 2F	.997	.062 (.044, .081)	77.021	34		
Women 1Fc	.992	.092 (.077, .107)	161.384	43		
Men 1F	.987	.094 (.076, .112)	150.466	44		
Men 2F	.994	.074 (.052, .096)	76.344	34		
Men 1Fc	.989	.086 (.068, .109)	116.054	43		
Women/Men 1Fc (Configural)	.991	.089 (.078, .101)	276.550	86		
Women/Men 1Fc (Invariant FL+T)	.992	.072 (.062, .082)	311.403	128	34.853 (42)	>.001
Women/Men 1Fc (Par-Invariant FL+T)	.992	.072 (.061, .082)	305.518	126	28.968 (40)	.088

Note. CFI = Comparative Fit Index, RMSEA = Root Mean Square Error of Approximation, CI = confidence interval, *df* = degrees of freedom, FL+T = Factor loadings and thresholds, 2F = two-factor ESEM models, 1Fc = error terms between Items 7 and 9 were allowed to correlate freely, Par = Partially. In the partially invariant model, constraints across threshold 1 and 2 of Item 6 were freed.

Table 3

Descriptive Statistics, Correlational Analysis and Sex Differences

	1	2	3	4	5	6	Women (n = 327)				Men (n = 228)				d (95% CI)
							Range[a]	ρ	*M*	*SD*	Range[a]	ρ	*M*	*SD*	
1. Age	-	.17*	.01	-.15*	-.13*	-.10	18-30	-	21.46	2.68	18-30	-	21.16	2.95	-0.11 (-0.28, 0.06)
2. BMI	-.12*	-	-.07	-.04	00	.20**	15.24-36.33	-	22.49	3.62	17.92-34.09	-	23.64	2.83	0.35 (0.18, 0.52)
3. Depressive symptoms	-.07	.09	-	.37***	.54***	.55***	0-4	.91	1.11	0.98	0-4	.88	0.82	0.86	-0.31 (-0.48, -0.14)
4. PAC	-.04	.27***	.47***	-	.74***	.65***	0-4	.97	1.38	1.11	0-4	.96	1.06	0.90	-0.31 (-0.48, -0.14)
5. SPA	-.08	.35***	.59***	.79***	-	.79***	1-5	.95	2.52	1.13	1-5	.95	2.02	0.95	-0.47 (-0.64, -0.30)
6. DE symptoms	-.07	.37***	.59***	.78***	.87***	-	0-5	.80	0.97	1.20	0-5	.75	0.75	1.00	-0.20 (-0.37, -0.03)

Note. BMI= Body mass index; ρ = Composite reliability index; *d* = Cohen's d effect size of difference. To facilitate interpretation, means and standard deviations for depressive symptoms, physical appearance comparisons (PAC), social physique anxiety (SPA) and symptoms of disordered eating (DE) correspond to instruments' mean scores. Correlations were derived from plausible composite latent scores. Correlation values below (above) the diagonal correspond to girls (boys).

[a] Referring to the observed range in the case of age/BMI and the possible range for the remaining variables.

*p < .05; **p < .01; ***p < .001

Table 4

Summary of Direct and Indirect Effects of Physical Appearance Comparison on Symptoms of Disordered Eating

				95% BCA-CI	
Outcomes	Predictors	*β*	*SEB*	Lower	Upper
SPA	Age	-.055	.024	-.103	-.008
$F(5, 549) = 245.899$, $p < .001$, $R^2 = .691$	Sex	-.165	.050	-.103	-.008
	BMI	.125	.025	.077	.174
	Depressive symptoms	.293	.027	.241	.346
	PAC	.613	.027	.560	.666
DE symptoms	Age	-.017	.021	-.059	.024
$F(6, 548) = 304.888$, $p < .001$, $R^2 = .769$	Sex	-.018	.044	-.104	.067
	BMI	.141	.022	.098	.184
	Depressive symptoms	.160	.025	.110	.210
	PAC	.217	.033	.153	.281
	SPA	.557	.037	.484	.629
	PAC (indirect effect through SPA)	.341	.027	.293	.399
	PAC (total effect)	.558	.028	.503	.613

Note. *β* = standardized estimates, referring to direct effect (unless otherwise stated); *SE* = Standard error; BCA-CI = bias corrected and accelerated confidence interval; BMI = body mass index. PAC = physical appearance comparisons; SPA = social physique anxiety; DE = disordered eating. Results are derived from a 10,000 resample bootstrapping analysis. Except for the effect of both age and sex on DE symptoms, all the presented effects were significantly different from zero at the $p < .05$ level.