The development and validation of the Physical Appearance Comparison Scale-Revised (PACS-R)

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1. Introduction

Festinger's social comparison theory (1954) is a widely used theoretical framework for understanding how individuals appraise and evaluate themselves. According to social comparison theory, humans have an innate drive to evaluate their own opinions and abilities. While people generally prefer to evaluate themselves based on objective standards, the theory proposes that in the absence of such information individuals will evaluate themselves based on comparisons with similar others. Social comparison theory has proven to be a useful tool for understanding how humans gain self-knowledge in a number of domains, leading some researchers to suggest that social comparison may be one of the most important means through which individuals learn about and evaluate themselves (Buunk & Gibbons, 2007; Wood, 1989). While the theory originally addressed only comparisons of opinions and abilities, it has now been expanded to address comparisons of personal attributes including physical appearance (Bailey & Ricciardelli, 2010; Myers & Crowther, 2009; Schachter, 1959; Strahan, Wilson, Cressman, & Buote, 2006; Wood, 1989).

Sociocultural theories of body image disturbance and eating pathology emphasize the potentially negative impact of making appearance-based social comparisons. One prominent etiological model of body dissatisfaction, the tripartite influence model (Thompson, Heineberg, Altabe, & Tantleff-Dunn, 1999), draws upon social comparison theory to explain how sociocultural influences may negatively impact one's body image. According to the model, body dissatisfaction may result when individuals experience pressure from powerful social agents (i.e., peers, family, and the media) to adhere to culturally-approved appearance ideals (i.e., thin ideal for women and muscular ideal for men). These pressures are proposed to lead to body dissatisfaction through two mediational processes: internalization of appearance ideals and appearance-based social comparisons. Body dissatisfaction then operates as a risk factor for subsequent eating pathology.

Research examining both the overall tripartite model and, more specifically, the association between appearance comparisons and body dissatisfaction has provided consistent support for the theorized impact of appearance comparisons on levels of body dissatisfaction in women (Keery, van den Berg, & Thompson, 2004; Rodgers, Chabrol, & Paxton, 2011). In addition, findings from survey data among females have demonstrated significant relationships between one’s tendency to engage in appearance comparisons and internalization of appearance ideals, self-esteem, friends’ preoccupation with weight and dieting, sexual objectification, body surveillance, body shame, drive for thinness, and eating pathology (Bamford & Halliwell, 2009; Davidson & McCabe, 2005; Keery et al., 2004; Thompson, Coover, & Stormer, 1999; Tiggeman & Miller, 2010; Tylka & Sabik, 2010).

Research examining social comparison processes among males is currently a limited but developing area. Findings among males have been somewhat less consistent than findings among females, with some studies supporting a relationship between male appearance comparisons and body dissatisfaction, and other studies failing to find this effect (Halliwell & Harvey, 2006; Humphries & Paxton, 2004;...
Ricciardelli, McCabe, & Banfield, 2000). Research has demonstrated sig-
ificant relationships between men’s tendency to engage in appearance comparisons and self-esteem, level of anxiety, sexual satisfaction, drive for muscularity, obligatory exercise, and body dysmorphic disorder symptomatology (Boroughs, Krawczyk, & Thompson, 2010; Cash & Smolak, 2011; Davison & McCabe, 2005; McCreary & Saucier, 2009; Smolak & Stein, 2006). Overall, evidence suggests that males engage in fewer appearance comparisons than females across the lifespan and that the effect of the comparison may be less damaging (Davison & McCabe, 2005, 2006; Jones, 2004; Jones, Vigfusdottir, & Lee, 2004). A recent meta-analysis of 189 effect sizes from correlational, experimental, and ecological momentary assessment data revealed a large positive effect of making appearance comparisons on body dissatisfaction, indi-
cating that engaging in more appearance comparisons is associated with higher levels of body dissatisfaction (Myers & Crowther, 2009). Gender moderated this relationship, with women evidencing a stronger relationship between appearance comparison and body dissatisfaction than men. Taken together, this body of literature suggests a deleterious role of appearance comparison on women’s and men’s mental health and body image.

A handful of scales have been developed to measure one’s tendency to engage in appearance comparisons, however, each of these scales has significant limitations. The Body Comparison Scale (BCS; Thompson et al., 1999) is a 25-item measure assessing the respondent’s tendency to compare specific body sites (e.g., ears, upper arms, thighs). However, the measure is limited in that it does not address a direct comparison of one’s weight or adiposity. This is a drawback of the scale, given that weight and thinness are two aspects of appearance that are often central to one’s body image (Dunn, Lewis, & Patrick, 2010; Striegel-Moore & Franko, 2002). Moreover, the scale does not provide information regarding the target of the comparison (i.e., who the respondent com-
pares his or her body to) or the context of the comparison (i.e., where the comparisons tend to occur). Such information would help to clarify the nature and potential triggers of appearance comparisons.

O’Brien et al. (2009) developed a set of scales to separately assess the respondent’s tendency to engage in comparisons with individuals believed to be much more attractive than herself/himself (Upward Physical Appearance Comparison Scale; UPACS), as well as a tendency to engage in comparisons with individuals who are perceived to be much less attractive (Downward Appearance Comparison Scale, DACS). Notably, the scales are limited in that they exclude an assessment of lateral comparisons (i.e., comparisons with individuals believed to be of similar attractiveness). Social comparison theory suggests that comparisons with similar others occur at the highest frequency and may be the primary means by which individuals gain self-knowledge. Therefore, the UPACS and DACS may provide a very limited picture of how often respondents engage in appearance comparisons and may greatly underestimate comparison frequency.

Most recently, Fitzsimmons-Craft, Bardone-Cone, and Harney (2012) developed the Body, Eating, and Exercise Comparison Orienta-
tion Measure (BEECOM) to assess three dimensions of comparison (2012) developed the Body, Eating, and Exercise Comparison Orienta-
tion Measure (BEECOM) to assess three dimensions of comparison (2012) developed the Body, Eating, and Exercise Comparison Orienta-
tion Measure (BEECOM) to assess three dimensions of comparison. The BEECOM is a notable addition to the body of literature as it provides, for the first time, a measure of the degree to which women compare their eat-
ing behaviors and exercise behaviors, in addition to simple comparisons of their appearance. While the BEECOM allows for a more comprehensive assessment of understudied comparison behaviors, it is limited in that the measure was developed specifically for use with female respondents (example item: “I notice how I compare with my peers in terms of specific parts of the body such as stomach, hips, breasts, etc.”) and may be inappropriate for use with men.

The Physical Appearance Comparison Scale (PACS; Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1991) is the most commonly used validated measure of appearance comparison (Myers & Crowther, 2009). In the 12 years since the measure’s publication, research on body image and appearance comparison has expanded greatly, highlighting several avenues for improvement to the scale. While Thompson et al. (1991) report adequate reliability for the scale, the PACS has sometimes suffered from marginal to poor reliability (Vander Wal, 2000), and several studies have indicated that the single reverse-scored item in the 5-item measure often weakens the reliability of the scale and must be deleted in order to reach adequate internal consistency (Davison & McCabe, 2005; Keery et al., 2004). In addition to the psychometric concerns with the scale, important theoretical issues also warrant attention. Research indicates that male body image concerns differ from female body image concerns. While females desire a slender yet curvaceous body (Ahern & Hetherington, 2006), males desire a lean muscular body (Thompson & Cafri, 2007). These divergent ideals may have implications for the specific aspects of physical appearance that are most relevant to male and female appearance comparisons. As the PACS was developed for use with women, the components of appearance addressed therein (e.g., one’s “figure”) may be more suitable for assessing female comparisons than male appearance comparisons. Indeed it is possible that the inconsistent findings seen in much of the research on the frequency and impact of male appearance comparisons may be due in part to use of measure-
ment tools that do not address aspects of appearance found to be impor-
tant to men. Relatedly, a large body of evidence now indicates that weight and shape are central aspects of body image for both women and men (Ahern & Hetherington, 2006; Thompson & Cafri, 2007). More-
over, dissatisfaction with weight and shape may be most closely related to eating disordered behaviors (Fairburn & Beglin, 2008). As the PACS does not assess comparisons of weight or shape, incorporation of these aspects of appearance may improve the measure’s ability to predict eating pathology in women and men. Finally, while research indi-
cates that individuals engage in appearance comparisons with a wide range of people and in a wide range of contexts (Foddy & Crundall, 1993; Lehey, Crowther, & Mickelson, 2007; Russo, 2010), the PACS is limited in that it only addresses comparisons that take place at “parties or social events” or in “social situations.” This narrow range of contexts precludes an assessment of appearance comparisons that may occur during other daily interactions or activities and may underestimate the true frequency of women’s and men’s appearance comparisons. Moreover, assessment of appearance comparison frequency within a broader array of social settings may help to elucidate situations that tend to elicit higher levels of appearance comparison. For example, set-
tings that promote a focus on appearance (e.g., clothing stores or gyms) may evoke higher levels of appearance comparison, while situations with less of an overt appearance-focus may elicit fewer comparisons.

In summary, appearance comparison is a well-established correlate of body dissatisfaction and eating pathology in women, with a growing body of literature supporting these relationships in men as well. While several measures of appearance comparison exist, each exhibits notable limitations. Therefore, the aim of the current project was to revise the most widely used measure of appearance comparison, the PACS, to ad-
dress some of the limitations of the original measure. Specifically, the main goals for the revision were to improve the psychometric properties of the scale, to examine different aspects of physical appearance that might be the basis of comparison for both males and females, and to include a broad range of contexts for appearance comparison.

2. Study 1: Scale development and identification of scale structure

The purpose of Study 1 was to generate gender-neutral items assessing appearance comparison in a wide range of contexts. The factor structure of the items was then examined using exploratory factor analysis (EFA) and parallel analysis.

2.1. Item generation

The procedure for item generation followed the guidelines set forth by Clark and Watson (1995). A panel of experts on the topic of body
image was assembled to review the relevant literature (including an examination of extant appearance comparison measures), to discuss the construct of appearance comparison and its relation to the constructs of body dissatisfaction and eating pathology, and to generate possible contexts and aspects of appearance that would be theoretically relevant to appearance comparison in both women and men. Group discussion led to the retention of eight contexts (i.e., in public, when meeting a new person, at work or school, when shopping for clothes, at a party, at the gym, with a group of friends, or at a restaurant) and five aspects of appearance (i.e., physical appearance, weight, body shape, body size, body fat) to be examined in the scale. Notably, these physical attributes were chosen because they are thought to capture women’s and men’s specific body image concerns using more general or universal terminology. For example, “body size” may refer to a comparison of height or musculature (physical attributes important to men’s body image), as well as the degree to which a woman conforms to the thin ideal. Contexts were chosen to represent a continuum of situations that promote higher or lower levels of appearance focus. For example, appearance focus is likely to be higher at the gym, but lower when spending time with a group of friends. In the revised scale, items were constructed such that comparison of each of the five aspects of appearance is evaluated within each of the eight contexts (e.g., “When I’m at the gym, I compare my weight to the weight of others”). This yielded a total of forty items to be evaluated.

2.2. Method

2.2.1. Participants

Participants were 1176 female undergraduate students who were recruited through the psychology research participant pool at a large Southeastern university. Statistical software was used to randomly divide the full sample in half so that the exploratory factor analysis and parallel analysis could be conducted using one half (Sample 1, n = 578) and the confirmatory factor analysis using the other half (Sample 2, n = 598). Participants in Sample 1 ranged in age from 18 to 60, with a mean age of 20.99 (SD = 5.03). Fifty-eight percent of the sample identified themselves as Caucasian, 11.5% as Black or African American, 13.1% as Hispanic or Latina, 3.2% as Asian, 0.7% as American Indian or Alaskan Native, 0.5% as Native Hawaiian or Pacific Islander, and 11.3% as multiracial or other. The average BMI of the sample was 23.47 (SD = 4.90, range from 15.33 to 45.72).

2.2.2. Measures

2.2.2.1. Demographic information. Participants completed a brief demographics questionnaire in which they were asked to indicate their age, ethnicity, sexual orientation, height, and weight. Each participant’s self-reported height and weight were used to calculate her Body Mass Index (BMI; kg/m²).

2.2.2.2. Physical Appearance Comparison Scale-Revised (PACS-R). The 40-item PACS-R was developed to measure one’s tendency to compare his or her physical appearance to the physical appearance of others. Participants were asked to indicate how often they make each kind of comparison using a 5-point Likert scale ranging from 0 (“Never”) to 4 (“Always”).

2.2.3. Procedure

All measures were administered online through a secure internet-based website. Following online recruitment through the university’s undergraduate research pool, participants were re-directed to the study homepage where they provided electronic consent and completed the set of questionnaires. Upon completion of the survey, participants were debriefed online and received extra course credit for their participation.

2.2.4. Data analyses

To examine the underlying structure of the PACS-R, an exploratory factor analysis using principal axis factoring and Promax oblique rotation was conducted. The number of underlying factors was determined using a combination of three strategies: eigenvalues equal to or greater than 1.0 (Guttman, 1954; Kaiser, 1960), visual examination of the scree plot (Cattell, 1966), and Horn’s parallel analysis (Horn, 1965; Zwick & Velicer, 1986). Item deletion criteria were determined a priori. Specifically, items with low primary factor loadings (<.40) or those that cross-loaded highly on more than one factor (>.30 on second factor) were candidates for deletion (Floyd & Widaman, 1995; Ford, MacCullum, & Tait, 1986). All analyses were conducted using SPSS Version 20.0 statistical software. Missing data were handled using listwise deletion.

2.3. Results

Of the original 578 cases, 63 participants failed to complete each item in the PACS-R and were excluded from the analysis. Therefore, 515 cases were utilized in the exploratory factor analysis. Based on the number of eigenvalues that were greater than or equal to 1.0, a three factor solution emerged. However, there was a high degree of content overlap among the factors making interpretation of each factor unclear. Examination of the scree plot suggested a single factor solution. Results from the parallel analysis indicated that a single factor solution was the best fit for the data.

2.4. Brief discussion

The purpose of Study 1 was to generate a set of items assessing appearance comparison in a variety of contexts and to examine the factor structure of the PACS-R using exploratory factor analysis and parallel analysis. Exploratory factor analysis was conducted using one half of the overall sample. The results from the EFA were mixed; the scree plot suggested a single factor solution, while eigenvalues suggested a three factor solution. Parallel analysis was conducted to clarify the factor structure of the scale. This analysis indicated that a single factor solution was the best fit for the data.

3. Study 2: confirmation of factor structure, scale refinement, and examination of the convergent validity of the PACS-R

In Study 2, confirmatory factor analysis (CFA) was used to verify the single factor structure of the PACS-R observed in Study 1. In addition, item analysis and modification indices obtained through CFA were used to eliminate problematic items from the final scale. The convergent validity of the PACS-R was assessed using a nomological network approach. Finally, the predictive utility of the PACS-R was evaluated by examining the measure’s ability to predict scores on theorized outcome variables (i.e., body satisfaction and eating pathology) over and above measures of sociocultural influence (i.e., internalization of appearance ideals and appearance-related pressures), and BMI.

3.1. Method

3.1.1. Participants

Study 2 utilized Sample 2 (n = 598). Participants in Sample 2 ranged in age from 18 to 58 (M = 20.81, SD = 4.44). Sixty percent of the sample identified themselves as Caucasian, 14.0% as Black or African American, 13.1% as Hispanic or Latina, 3.2% as Asian, 0.3% as American Indian or Alaskan Native, 0.5% as Native Hawaiian or Pacific Islander, and 8.9% as multiracial or other. The average BMI of the sample was 23.88 (SD = 5.31, range from 15.95 to 48.55).
3.1.2. Measures

In addition to the demographics questionnaire and PACS-R (described in Study 1), participants also completed self-report measures of body satisfaction, eating disorder symptomatology, appearance-related sociocultural influences, and global self-esteem.

3.1.2.1. Multidimensional Body-Self Relations Questionnaire—Appearance Evaluation subscale (MBSRQ-AE). The Appearance Evaluation subscale of the MBSRQ was used to measure body satisfaction (Brown, Cash, & Mikulka, 1990). The AE subscale is comprised of seven items that assess the extent to which one likes his or her body. Items are rated on a 5-point Likert scale, ranging from “Definitely Disagree” to “Definitely Agree” with higher scores indicating greater body satisfaction. The MBSRQ-AE has been shown to be a reliable and valid measure of body satisfaction in community samples (Cash, 2000). Cronbach’s alpha in the current sample was .91.

3.1.2.2. Eating Disorder Examination-Questionnaire (EDE-Q). The EDE-Q (Fairburn & Beglin, 2008) is a widely used measure of disordered eating attitudes and behaviors. The measure consists of 28 items and contains four subscales: Restrained Eating, Concerned about Shape, and Weight Concern. The EDE-Q global score is a composite of the subscale scores and represents the respondent’s overall level of eating pathology. Respondents indicate the frequency of eating disordered thoughts/behaviors using a 4-point Likert scale ranging from “No Days” to “Everyday.” Higher scores indicate greater levels of eating pathology. All subscales as well as the global score have demonstrated good internal consistency in community samples (Peterson et al., 2007). In the current sample, internal consistency values ranged from .82 for the Eating Concern subscale to .95 for the global score.

3.1.2.3. Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4). The SATAQ-4 (Schaefer et al., under review) is a 22-item measure assessing sociocultural influences on appearance ideals. The SATAQ-4 contains five subscales. Two subscales assess internalization of appearance ideals most relevant to women and men. The Internalization: Thin/Low Body Fat subscale assesses internalization of the thin ideal, while the Internalization: Muscular/Athletic subscale assesses internalization of the muscular ideal. In addition, the SATAQ-4 contains three subscales that assess appearance-related pressures from three domains of sociocultural influence (i.e., Pressures: Peers, Pressures: Family, Pressures: Media). Respondents indicate their level of agreement with each of the statements using a 5-point Likert scale ranging from “Definitely Agree” to “Definitely Disagree.” Higher scores on the SATAQ-4 and its subscales indicate greater appearance-related sociocultural influence. The SATAQ-4 demonstrated excellent internal consistency in three separate samples of undergraduate women, with alphas ranging from .85 to .96 (Schaefer et al., under review). Internal consistency values in the current sample ranged from .87 for the Internalization: Thin/Low Body Fat subscale and .95 for the Pressures: Media subscale.

3.1.2.4. Rosenberg Self-esteem Scale (RSES). The RSES (Rosenberg, 1965) is a widely used 10-item measure of global self-esteem and general feelings of self-worth. Participants indicate their agreement with each item using a 4-point Likert scale ranging from “Strongly Disagree” to “Strongly Agree.” Higher total scores indicate higher self-esteem. The RSES has been shown to be a reliable and valid measure of self-esteem (Sinclair et al., 2010). Internal consistency in the present sample was .92.

3.1.3. Procedure

The procedure for data-collection is described in Study 1.

3.1.4. Data analyses

A confirmatory factor analysis was performed using Mplus 6.12 (Muthén & Muthén, 2010) statistical software in order to evaluate the single factor structure of the PACS-R and guide the elimination of items from the scale. Missing data were handled using full information maximum likelihood estimation. Multiple fit indices were examined to determine how well the model fit the data. The following guidelines were used to indicate good model fit: Comparative Fit Index (CFI) values of .95 or higher and Standardized Root Mean Square Residual (SRMR) values of .05 or less (Byrne, 1998; Hu & Bentler, 1999). For the Root Mean Square Error of Approximation (RMSEA), values of about .05 and lower are considered to represent good fit, about .05 to .08 represents acceptable fit, and about .08 to .10 represents marginal fit (Brown & Cudeck, 1993).

When results from the CFA indicated poor model fit, modification indices were used to identify the source of misfit. Item analysis was conducted next. Item discrimination was assessed via the corrected item-total correlation. Values of .30 or higher are considered to be acceptable (Nunnally & Bernstein, 1994). Item difficulty was assessed via item means. Guidelines suggest that items within a scale should be of uniform moderate difficulty (Crocker & Algina, 2008).

Following a nomological network approach to construct validation, the relationships between the PACS-R and other theoretically related variables were examined via Pearson product–moment correlations (Cronbach & Meehl, 1955). Consistent with previous literature, it was hypothesized that the PACS-R would be positively correlated with measures of eating pathology, internalization of appearance ideals, and appearance-related pressures. The PACS-R was expected to exhibit negative correlations with measures of body satisfaction and self-esteem.

Using the tripartite influence model as a theoretical framework, hierarchical multiple regression analyses were performed to evaluate the PACS-R as a predictor of theorized outcome variables (body satisfaction and eating pathology) controlling for internalization of appearance ideals and appearance-related pressures. BMI was also controlled for as it is a well-established predictor of body satisfaction and eating pathology (e.g., Ro, Reas, & Rosenvinge, 2012). SPSS 20.0 statistical software was used to conduct item analysis, correlational analyses, and regression analyses.

3.2. Results

3.2.1. Confirmatory factor analysis

Of the 598 cases in the sample, 36 cases contained missing data on all PACS-R items and were excluded from the analyses. Therefore, a total of 562 cases were analyzed in the confirmatory factor analysis. The initial CFA using all 40 items indicated poor model fit: \( \chi^2 = 8648.02 (df = 740, p < .001) \), CFI = .79, RMSEA = .14, SRMR = .04. Examination of the modification indices revealed numerous items with highly correlated residuals. Correlated residuals in two items represent shared variance that is not explained by the latent variable (in this case, the construct of appearance comparison). Importantly, the majority of the modification indices indicated pairs of items sharing the same context, suggesting that participants viewed many item pairs containing the same context as being highly similar. Based on this, modification indices were used to eliminate items with highly correlated residuals, thus improving model fit and reducing redundancy in the scale. The procedure used for this analysis was as follows: The 40-item PACS-R was entered into the CFA, the fit indices were noted, and the largest resulting modification index was identified. One item in the pair was deleted and the newly adjusted scale was re-entered into the CFA. Through this process, 29 items were deleted. The analysis resulted in an 11-item scale that demonstrated good model fit according to the CFI and SRMR, and marginal fit according to the RMSEA: \( \chi^2 = 317.24 (df = 44, p < .001) \), CFI = .96, RMSEA = .105, SRMR = .02.

3.2.2. Item analysis and reliability

All 11 items in the PACS-R exhibited corrected item-total correlations of .76 or higher. Item means ranged from 1.86 to 2.43, which is within the medium difficulty range. Therefore, all 11 items were retained. The
average PACS-R score for the sample was 2.24 (SD = 1.03), indicating that participants generally engage in moderate levels of appearance comparisons. Cronbach’s alpha for the scale was .97. See Table 1 for item descriptive statistics.

3.2.3. Convergent validity

The PACS-R demonstrated significant associations with each of the examined variables in the hypothesized direction. Table 2 presents the correlation matrix for all variables. The PACS-R was significantly positively correlated with measures of eating pathology, internalization of appearance ideals, and appearance-related pressures from peers, family, and the media. As expected, in the current all-female sample, the PACS-R was more strongly correlated with thin ideal internalization compared to muscular ideal internalization. The PACS-R was significantly negatively correlated with measures of body satisfaction and self-esteem.

3.2.4. Multiple regression analyses

Hierarchical multiple regression analyses were conducted to examine the unique variance associated with the PACS-R in predicting body satisfaction and eating pathology while controlling for other relevant predictors (see Table 3). Results from step 2 in the analyses indicated that the PACS-R was a significant predictor of body satisfaction ($\beta = -\cdot31, p < .001$) and eating pathology ($\beta = .25, p < .001$). The PACS-R accounted for 5% of the variance in body satisfaction after controlling for internalization of appearance ideals, appearance-related pressures, and BMI. The measure also accounted for 3% of the variance in eating pathology after controlling for BMI, sociocultural influences, and body satisfaction. Comparison of the standardized regression coefficients in step 2 of the regression analyses predicting body satisfaction and eating pathology indicates that the PACS-R was the second strongest predictor of both criterion variables. These results support the utility of the PACS-R in predicting body satisfaction and eating pathology in college women. It is worth noting that the 11-item scale and full 40-item scale performed comparably in predicting body satisfaction and eating pathology. The 40-item PACS-R accounted for 30% of the variance in body satisfaction scores, while the 11-item PACS-R accounted for 29% of the variance. In predicting eating pathology scores, the 40-item PACS-R accounted for 45% of the variance, while the 11-item PACS-R was able to account for 44% of variance in scores. Therefore, the 11-item scale appears to perform almost as well as the full set of 40 items in predicting relevant outcomes.

3.3. Brief discussion

In Study 2 the single factor structure of the PACS-R was examined using confirmatory factor analysis. The initial CFA on the 40-item scale indicated poor fit. Modification indices suggested that participants

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Table 1

<table>
<thead>
<tr>
<th>Item</th>
<th>M</th>
<th>SD</th>
<th>Item-total correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. When I'm out in public, I compare my physical appearance to the appearance of others.</td>
<td>2.45</td>
<td>1.08</td>
<td>.85</td>
</tr>
<tr>
<td>2. When I meet a new person (same sex), I compare my body size to his/her body size.</td>
<td>2.30</td>
<td>1.14</td>
<td>.87</td>
</tr>
<tr>
<td>3. When I'm at work or school, I compare my body shape to the body shape of others.</td>
<td>2.32</td>
<td>1.12</td>
<td>.89</td>
</tr>
<tr>
<td>4. When I'm out in public, I compare my body fat to the body fat of others.</td>
<td>2.16</td>
<td>1.18</td>
<td>.89</td>
</tr>
<tr>
<td>5. When I'm shopping for clothes, I compare my weight to the weight of others.</td>
<td>2.13</td>
<td>1.24</td>
<td>.82</td>
</tr>
<tr>
<td>6. When I'm at a party, I compare my body shape to the body shape of others.</td>
<td>2.33</td>
<td>1.19</td>
<td>.85</td>
</tr>
<tr>
<td>7. When I'm with a group of friends, I compare my weight to the weight of others.</td>
<td>2.22</td>
<td>1.18</td>
<td>.87</td>
</tr>
<tr>
<td>8. When I'm out in public, I compare my body size to the body size of others.</td>
<td>2.21</td>
<td>1.15</td>
<td>.89</td>
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<tr>
<td>9. When I'm with a group of friends, I compare my body size to the body size of others.</td>
<td>2.22</td>
<td>1.17</td>
<td>.87</td>
</tr>
<tr>
<td>10. When I'm eating in a restaurant, I compare my body fat to the body fat of others.</td>
<td>1.86</td>
<td>1.26</td>
<td>.81</td>
</tr>
<tr>
<td>11. When I'm at the gym, I compare my physical appearance to the appearance of others.</td>
<td>2.40</td>
<td>1.20</td>
<td>.76</td>
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Table 2

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</tbody>
</table>

Note: PACS-R = Physical Appearance Comparison Scale-Revised; MBSRQ-AE = Appearance Evaluation subscale of the Multidimensional Body-Self Relations Questionnaire; EDEQ-G = Global Score for the Eating Disorder Examination-Questionnaire; EDEQ-R = Restraint subscale for the Eating Disorder Examination-Questionnaire; EDEQ-EC = Eating Concern subscale for the Eating Disorder Examination-Questionnaire; EDEQ-SC = Shape Concern subscale for the Eating Disorder Examination-Questionnaire; EDEQ-WC = Weight Concern subscale for the Eating Disorder Examination-Questionnaire; SATAQ4-TI = Thin Ideal Internalization subscale of the Sociocultural Attitudes Towards Appearance Questionnaire-4; SATAQ4-PP = Peer Pressures subscale of the Sociocultural Attitudes Towards Appearance Questionnaire-4; SATAQ4-EC = Family Pressures subscale of the Sociocultural Attitudes Towards Appearance Questionnaire-4; SATAQ4-TI = Thin Ideal Internalization subscale of the Sociocultural Attitudes Towards Appearance Questionnaire-4; RSES = Rosenberg Self-Esteem Scale; BMI = Body Mass Index.

*p < .05.

**p < .01.
It is worth noting that although the PACS-R was ultimately reduced to 11 items, the full 40-item version of the measure may still be utilized by researchers and clinicians to illuminate differences in rates of comparison by contexts or aspects of appearance. In other words, item scores in the full version of the scale may be averaged across context or across aspects of appearance. Mean-level differences in rates of comparison would then provide rich information regarding contexts/ aspects of appearance that are more or less likely to be involved in appearance comparisons. The 40-item scale may also help to identify aspects of appearance comparison that are most closely associated with negative outcomes (e.g., body dissatisfaction and eating pathology). For example, do comparisons of weight or overall physical appearance better predict body dissatisfaction and eating pathology? Future research might also examine participant characteristics (e.g., BMI or ethnicity) as moderators of these relationships.

3.4. General discussion

Sociocultural theories of body dissatisfaction and eating pathology suggest that appearance comparisons play an important role in the development of these negative outcomes (Thompson, Heinberg, et al., 1999), and research supports this association (e.g., Myers & Crowther, 2009). The aim of the current project was to revise the most widely used measure of appearance comparison, the Physical Appearance Comparison Scale-Revised, in order to address some of the limitations of the original measure. Specifically, the main goals for the revision were to improve the psychometric properties of the scale, to examine aspects of physical appearance that might be the basis of comparison for both females and males, and to include a broad range of contexts for appearance comparison.

In Study 1, exploratory factor analysis and parallel analysis were used to determine the underlying factor structure of the revised scale. These analyses suggested that a single factor solution was the best fit to the data. In Study 2, confirmatory factor analysis was used to verify the single factor structure and trim redundant items from the scale. This analysis resulted in an 11-item scale assessing one’s tendency to make appearance-based comparisons in a variety of social contexts. This brief measure demonstrated excellent reliability and convergent validity in a sample of female college students. The results indicated that college women engage in moderate levels of appearance comparison, as well as higher levels of appearance-related pressures, internalization of appearance ideals, and eating pathology. Consistent with the tripartite influence model, appearance comparison was uniquely predictive of body satisfaction and eating pathology.

Table 3
Hierarchical regression analysis predicting body satisfaction and eating pathology.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Step 1</th>
<th>Step 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$R^2$</td>
<td>$\Delta R^2$</td>
</tr>
<tr>
<td>Criterion variable: body satisfaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SATAQ4-T1</td>
<td>-4.3***</td>
<td></td>
</tr>
<tr>
<td>SATAQ4-MI</td>
<td>-17***</td>
<td>.14***</td>
</tr>
<tr>
<td>SATAQ4-FP</td>
<td>-.13***</td>
<td>-10***</td>
</tr>
<tr>
<td>SATAQ4-PP</td>
<td>-14***</td>
<td>-.28***</td>
</tr>
<tr>
<td>SATAQ4-MP</td>
<td>-17***</td>
<td>-.09***</td>
</tr>
<tr>
<td>BMI</td>
<td>-33***</td>
<td>-29***</td>
</tr>
<tr>
<td>PACS-R</td>
<td>.45</td>
<td>72.06*** (6, 531)</td>
</tr>
</tbody>
</table>

Criterion variable: eating pathology

<table>
<thead>
<tr>
<th>Variable</th>
<th>Step 1</th>
<th>Step 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SATAQ4-T1</td>
<td>.17**</td>
<td></td>
</tr>
<tr>
<td>SATAQ4-MI</td>
<td>.04</td>
<td>.04</td>
</tr>
<tr>
<td>SATAQ4-FP</td>
<td>.09***</td>
<td>.08**</td>
</tr>
<tr>
<td>SATAQ4-PP</td>
<td>.17***</td>
<td>.13**</td>
</tr>
<tr>
<td>SATAQ4-MP</td>
<td>.15***</td>
<td>.08**</td>
</tr>
<tr>
<td>BMI</td>
<td>.16***</td>
<td>-.25***</td>
</tr>
<tr>
<td>MBISQ-AP</td>
<td>-.40***</td>
<td></td>
</tr>
<tr>
<td>PACS-R</td>
<td>.65</td>
<td>134.45*** (7, 507)</td>
</tr>
</tbody>
</table>

Note. SATAQ4-T1 = Thin Ideal Internalization subscale of the Sociocultural Attitudes Towards Appearance Questionnaire-4; SATAQ4-MI = Muscular Ideal Internalization subscale of the Sociocultural Attitudes Towards Appearance Questionnaire-4; SATAQ4-PP = Peer Pressures subscale of the Sociocultural Attitudes Towards Appearance Questionnaire-4; SATAQ4-MP = Media Pressures subscale of the Sociocultural Attitudes Towards Appearance Questionnaire-4; BMI = Body Mass Index; MBISQ-AP = Appearance Evaluation subscale of the Multidimensional Body-Self Relations Questionnaire; PACS-R = Physical Appearance Comparison Scale-Revised.

* $p<.05$.
** $p<.01$.
*** $p<.001$. 

It is worth noting that although the PACS-R was ultimately reduced to 11 items, the full 40-item version of the measure may still be utilized by researchers and clinicians to illuminate differences in rates of comparison by contexts or aspects of appearance. In other words, item scores in the full version of the scale may be averaged across context or across aspects of appearance. Mean-level differences in rates of comparison would then provide rich information regarding contexts/aspects of appearance that are more or less likely to be involved in appearance comparisons. The 40-item scale may also help to identify aspects of appearance comparison that are most closely associated with negative outcomes (e.g., body dissatisfaction and eating pathology). For example, do comparisons of weight or overall physical appearance better predict body dissatisfaction and eating pathology? Future research might also examine participant characteristics (e.g., BMI or ethnicity) as moderators of these relationships.
The new measure improves on the original scale in several important ways. Consistent with the main aims of the revision, the PACS-R exhibited improved psychometric functioning. While the original PACS was developed for use with women and therefore contained potentially gender-specific content, the PACS-R was specifically developed to incorporate more gender-neutral language to increase the scale’s relevance to male respondents. Extant research utilizing the PACS and other measures of appearance comparison among males has yielded inconsistent findings, perhaps due in part to an inability to capture aspects of appearance comparisons that are applicable to men. By utilizing more gender-neutral references to appearance, the PACS-R may help to clarify both the degree of appearance comparisons among men, as well as the associations with potentially related constructs.

For example, the PACS-R now includes an assessment of weight and shape, which are two aspects of appearance that are important to men’s and women’s body image. Moreover, through the addition of weight and shape comparisons, the PACS-R may now capture aspects of appearance that are more closely tied to eating pathology. Indeed, the PACS-R was most strongly associated with the Weight Concern and Shape Concern subscales of the EDE-Q, suggesting that appearance comparisons are closely associated with an unhealthy concern about one’s weight and shape. Finally, the original PACS included a narrow sampling of contexts for appearance comparison, which may lead to an underestimation of comparison frequency. The PACS-R incorporates a wider array of contexts, which may provide a more accurate assessment of respondents’ frequency of appearance-based comparisons and may provide insight into particular settings that tend to elicit higher or lower levels of appearance comparison.

Several limitations to the current study must be noted. Items for the PACS-R were intentionally written to incorporate more gender-neutral language in order to be applicable to both females and males. This is both a strength and a potential weakness of the scale as the PACS-R does not directly address aspects of physicality that research suggests are uniquely important to male and female body images. While care was taken to utilize terminology that would more broadly encompass gender-specific concerns (e.g., a comparison of weight, rather than a comparison of thinness), it is possible that items may not fully capture men’s and women’s unique concerns. Additionally, evidence suggest that men and women engage in both upward and downward appearance comparisons, with individuals who engage more frequent upward comparisons exhibiting higher levels of body dissatisfaction and disordered eating (Leahy & Crowther, 2008; Leahy et al., 2007). While the PACS-R is not able to assess these distinct and potentially important nuances of appearance comparison, naturalistic studies of appearance comparison indicate that when women make appearance comparisons, they are most often upward comparisons (Leahy, Crowther, & Ciesla, 2011). Thus it is likely that the PACS-R primarily captures upward comparisons. Relatedly, research suggests that individuals engage in appearance comparisons with proximal others (i.e., individuals with whom one has personal contact such as peers) and distal others (i.e., individuals with whom one does not have personal contact such as celebrities). Although such comparisons have been shown to have comparable associations with body dissatisfaction (Myers & Crowther, 2009), the PACS-R solely assesses appearance comparisons with proximal others and is unable to assess comparisons with distal others. In future work, additional items may be developed to assess individual differences in the tendency to make upward versus downward comparisons, as well as comparisons with proximal versus distal others.

Importantly, the current study utilized an all female sample as research indicates that women engage in more frequent appearance comparisons and that women’s comparisons are more closely related to body dissatisfaction (Jones, 2004; Myers & Crowther, 2009). However, future work should evaluate the psychometric properties of the PACS-R among males. In addition, the current sample was drawn from a college setting and was comprised of primarily Caucasian women, most of whom were between the ages of 18 to 24. Additional work is needed to examine the PACS-S in more diverse populations including older/younger women, ethnic minority groups, and clinical populations. Finally, the cross-sectional design of the study prevents examination of the theorized causal role of appearance comparisons on negative outcomes, or the measure’s ability to prospectively predict subsequent increases in body dissatisfaction and eating pathology. Longitudinal work may be undertaken to determine whether the PACS-R is able to prospectively predict increases in theorized negative outcome variables.

In addition to its use as a research tool, the new PACS-R may have strong clinical utility as well. Extant research largely supports the role of appearance comparisons in the etiology of body image disturbance and eating pathology (Cattarin, Thompson, Thomas, & Williams, 2000; Leahy et al., 2007), and Fairburn’s widely-regarded transdiagnostic model of eating pathology highlights the potential for appearance comparisons to appear as a manifestation of a patholog-ical over-evaluation of shape and weight and to serve as a maintain-ing factor in the disorder (Fairburn, 2008). Empirically-supported cognitive-behavioral treatment manuals for body image disturbance and eating pathology highlight the need to address appearance comparisons during therapy in order to fully dismantle the core maintaining features of the disorder and prevent future relapse (Cash, 2008; Fairburn, 2008). Proper assessment of appearance comparison in both women and men is, therefore, a key step in the identification of these potentially harmful behaviors. In a clinical setting, the PACS-R could serve as a brief assessment of baseline levels of appearance comparison. If elevated levels of appearance comparisons are present, clinicians could provide psychoeducation on the harmful effects of appearance comparisons and the role of these behaviors in the maintenance of the disorder. Clients may be instructed to monitor their appearance comparisons in order to increase their awareness of these behaviors, as well as to identify common antecedents and consequences of such comparisons. Clients may then be taught specific strategies for challenging their appearance comparison tendencies. For example, a client who engages in numerous appearance comparisons may be taught helpful corrective and positive self-statements such as “A mental compliment of another person’s appearance does not have to be a criticism of my own appearance” (adapted from Cash, 2008). The full 40-item PACS-R may also be used to identify specific settings or aspects of the client’s appearance that are more likely to be involved in comparisons. This information would help to facilitate a more targeted approach for the therapeutic efforts. For example, if a client routinely engages in appearance comparisons at the gym, treatment may focus on addressing the unique aspects of appearance comparisons within that context. The PACS-R may then be readministered several times throughout treatment to monitor client progress.

The current study presents the development and validation of the Physical Appearance Comparison Scale–Revised (PACS-R). While the PACS-R improves on the original measure in several important ways, future work should continue to investigate the measure using more diverse populations and may consider incorporating additional items to assess upward versus downward comparisons. Overall, the Physical Appearance Comparison Scale–Revised promises to be a useful tool in the ongoing study of appearance-based comparisons.

Role of funding source
There were no funding agencies at any level that provided funding for this study.

Contributors
Each author contributed equally to the design, implementation, data collection and analysis, and write-up of the manuscript.

Conflict of interest
There are no personal, institutional or other conflicts associated with this manuscript.
### Appendix A. Full 40-item Physical Appearance Comparison Scale-Revised (PACS-R)

People sometimes compare their physical appearance to the physical appearance of others. This can be a comparison of their weight, body size, body shape, body fat or overall appearance. Thinking about how you generally compare yourself to others, please use the following scale to rate how often you make these kinds of comparisons.

<table>
<thead>
<tr>
<th>Never</th>
<th>Seldom</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

1. When I'm out in public, I compare my physical appearance to the appearance of others.  
2. When I meet a new person (same sex), I compare my body size to his/her body size.  
3. When I'm at work or school, I compare my body shape to the body shape of others.  
4. When I'm out in public, I compare my body fat to the body fat of others.  
5. When I'm shopping for clothes, I compare my weight to the weight of others.  
6. When I'm at a party, I compare my body shape to the body shape of others.  
7. When I'm at work or school, I compare my weight to the weight of others.  
8. When I'm eating in a restaurant, I compare my body shape to the body shape of others.  
9. When I'm with a group of friends, I compare my weight to his/her weight.  
10. When I'm shopping for clothes, I compare my weight to the weight of others.  
11. When I'm at a party, I compare my body size to the body size of others.  
12. When I'm at work or school, I compare my body size to the body size of others.  
13. When I'm with a group of friends, I compare my body shape to the body shape of others.  
14. When I'm at the gym, I compare my weight to the weight of others.  
15. When I'm at a party, I compare my weight to the weight of others.  
16. When I'm at the gym, I compare my body shape to the body shape of others.  
17. When I'm shopping for clothes, I compare my body shape to the body shape of others.  
18. When I'm with a group of friends, I compare my body fat to the body fat of others.  
19. When I'm shopping for clothes, I compare my physical appearance to the physical appearance of others.  
20. When I'm at a party, I compare my body fat to the body fat of others.  
21. When I meet a new person (same sex), I compare my body shape to his/her body shape.  
22. When I'm at work or school, I compare my body fat to the body fat of others.  
23. When I'm eating in a restaurant, I compare my physical appearance to the appearance of others.  
24. When I'm at the gym, I compare my body fat to the body fat of others.  
25. When I'm eating in a restaurant, I compare my physical appearance to the appearance of others.  
26. When I'm at a party, I compare my body size to the body size of others.  
27. When I meet a new person (same sex), I compare my body fat to his/her body fat.  
28. When I'm at work or school, I compare my physical appearance to the appearance of others.  
29. When I'm with a group of friends, I compare my body size to the body size of others.  
30. When I'm out in public, I compare my body fat to the body fat of others.  
31. When I'm at work or school, I compare my weight to his/her weight.  
32. When I meet a new person (same sex), I compare my physical appearance to his/her physical appearance.  
33. When I'm with a group of friends, I compare my physical appearance to the appearance of others.  
34. When I'm at a party, I compare my physical appearance to the appearance of others.  
35. When I meet a new person (same sex), I compare my body fat to his/her body fat.  
36. When I'm shopping for clothes, I compare my body size to the body size of others.  
37. When I'm at the gym, I compare my physical appearance to the appearance of others.  
38. When I'm eating in a restaurant, I compare my weight to the weight of others.  
39. When I'm eating in a restaurant, I compare my body size to the body size of others.  
40. When I'm out in public, I compare my body size to the body size of others.

### References


