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Development and validation of the Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4). *Psychological Assessment*, 27, 54-67.

**Development and Validation of the
Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4)**

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Abstract

The Sociocultural Attitudes Towards Appearance Questionnaire-3 (SATAQ-3) and its earlier versions are measures designed to assess societal and interpersonal aspects of appearance ideals. Correlational, structural equation modeling, and prospective studies of the SATAQ-3 have shown consistent and significant associations with measures of body image disturbance and eating pathology. In the current investigation, the SATAQ-3 was revised to improve upon some conceptual limitations and was evaluated in four US and three international female samples, as well as a US male sample. In Study 1, exploratory and confirmatory factor analyses for a sample of women from the Southeastern US ($N = 859$) indicated a 22-item scale with five factors: *Internalization: Thin/Low Body Fat*, *Internalization: Muscular/Athletic*, *Pressures: Family*, *Pressures: Media*, *Pressures: Peers*. This scale structure was confirmed in three independent and geographically diverse samples of women from the US (East Coast $N = 440$, West Coast $N = 304$, and North/Midwest $N = 349$). SATAQ-4 scale scores demonstrated excellent reliability and good convergent validity with measures of body image, eating disturbance, and self-esteem. Study 2 replicated the factorial validity, reliability, and convergent validity of the SATAQ-4 in an international sample of women drawn from Italy, England, and Australia ($N = 362$). Study 3 examined a sample of college males from the US ($N = 271$); the five-factor solution was largely replicated, yet there was some evidence of an underlying structure unique to men. Future research avenues include additional item testing and modification of the scale for men, as well as adaptation of the measure for children and adolescents.

Keywords: SATAQ, internalization, appearance ideals, sociocultural pressure, measurement, body image, eating disturbance.

Development and Validation of the Sociocultural Attitudes
Towards Appearance Questionnaire-4 (SATAQ-4)

Research has demonstrated an array of negative consequences associated with body image disturbance and eating pathology (e.g., decreased self-esteem, negative affect, unhealthy weight control practices, and serious medical complications) (Grossbard, Lee, Neighbors, & Larimer, 2009; Mellor, Fuller-Tyszkie, McCabe, & Ricciardelli, 2010; Mintz & Betz, 1988; Rodin, Silberstein, & Striegel-Moore, 1984; Stice, 2002). Consequently, researchers have sought to understand the etiology and maintenance of these disorders in order to illuminate potential points of intervention (Cash & Smolak, 2011; Stice, 2002). One prominent etiological model that has received strong empirical support is the tripartite influence model (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999), which is based on sociocultural theories of body image disturbance and disordered eating (Keel & Forney, 2013; Tiggemann, 2011). This model posits that individuals are pressured by powerful social agents (i.e., peers, family, and the media) to adhere to culturally-sanctioned appearance ideals, which emphasize thinness for women and muscularity for men. These social pressures are proposed to lead individuals to internalize relevant appearance ideals (i.e., to set the ideal as one's own personal standard of attractiveness). Internalization of the often unattainable ideal is thought to lead to body dissatisfaction, which is an established risk factor for unhealthy weight control practices and disordered eating (Thompson, Schaefer, & Menzel, 2012).

Because females report higher levels of body image disturbance and disordered eating (Striegel-Moore et al., 2009), the vast majority of work examining the tripartite influence model has been conducted using all-female samples, while fewer studies have examined the model in male samples. This body of research provides strong support for the proposed influence of

sociocultural agents on the development of body image disturbance and subsequent eating pathology in females. Cross-sectional and experimental studies examining the role of media in shaping body image and eating behaviors indicate that increased exposure to idealized media images and appearance-oriented content is related to heightened body dissatisfaction and disordered eating among young girls and women (Slevec & Tiggemann, 2011; Stice & Shaw, 1994). The relationship between media appearance pressures and body dissatisfaction among males is currently an understudied area; however, extant studies indicate that increased media pressure is associated with increased body dissatisfaction in males as well (Blond, 2008; Knauss, Paxton, & Alsaker, 2007; Thompson & Cafri, 2007).

While media influences have historically been the primary focus of research attention, recent investigations also demonstrate the importance of more proximal socializing agents in the transmission of messages regarding weight, shape, and appearance. Within the context of the family environment, parents are strong communicators of appearance ideals and exert appearance-related pressures through direct appearance-related comments and modeling of appearance concerns (Ata, Rojas, Ludden, & Thompson, 2011). Indeed, research suggests that such parental pressures exhibit considerable influence on sons' and daughters' body image and eating behaviors (Bearman, Presnell, Martinez, & Stice, 2006; Rodgers & Chabrol, 2009). While research examining gender differences in parental pressures is limited, boys appear to receive fewer negative appearance-related comments from parents and are less likely to report that these comments impact their body image (Stanford & McCabe, 2005). An additional source of familial pressure may stem from siblings, who have been shown to play a significant role in girls' dietary restraint (Vincent & McCabe, 2000). Finally, from an early age, peer groups emphasize and reinforce cultural standards of attractiveness through appearance-focused conversations,

appearance-related teasing, “fat talk,” and direct comments or criticism (Haines, Neumark-Sztainer, Hannan, van den Berg, & Eisenberg, 2008; Menzel et al., 2010). This peer-driven appearance pressure is an additional contributor to body dissatisfaction and disordered eating in males and females (Salk & Engeln-Maddox, 2012; Shoemaker & Furman, 2009). Similar to research examining gender differences in media and family pressures, studies suggest that males may receive lower levels of peer pressures (e.g., appearance or weight based teasing) than females, and that the association between peer pressures and negative outcomes may be weaker among males (Menzel et al., 2010). In sum, peers, family, and the media are each powerful purveyors of potentially harmful messages regarding shape, weight, and the need to achieve an ideal figure. While both males and females are recipients of sociocultural messages regarding appearance, females may be more often targeted and more negatively impacted than males.

According to the tripartite influence model, this constant social reinforcement of prominent appearance ideals encourages each individual to internalize the relevant appearance ideal (Cafri et al., 2005). Internalization refers to the degree to which an individual “buys into” socially-prescribed appearance ideals, expresses a desire to attain the appearance ideal, and engages in behaviors aimed at meeting those ideals (Thompson et al., 1999; Thompson & Stice, 2001). Within Westernized cultures, the “thin-ideal,” which denotes a thin or slender figure with low body fat and a toned physique, is the dominant appearance ideal for women (Ahern, Bennett, Kelly, & Hetherington, 2011; Thompson et al., 1999). The dominant appearance ideal for men, termed the “muscular-ideal,” refers to a figure that is lean, but muscular and athletic, with well-developed and defined upper body muscles (i.e., chest, arms, and shoulders), a v-shaped torso, and a slim waist and hips (Labre, 2005; Pope et al., 2000; Ridgeway & Tylka, 2005; Thompson & Cafri, 2007). Consequently, body image concerns for women generally center on issues of

weight, adiposity, and a desire to be thinner (Brown & Slaughter, 2011; Dunn et al., 2010; Field et al., 1999; Striegel-Moore & Franko, 2002), while body image concerns for males tend to center on a desire to have a lower percentage of body fat and greater muscularity (Cafri, Strauss, & Thompson, 2002; Pope, Phillips, & Olivardia, 2000; Thompson & Cafri, 2007). Researchers have posited internalization of the thin-ideal as a risk factor for body dissatisfaction and eating pathology among women (Thompson & Stice, 2001); prospective studies and meta-analytic reviews support this hypothesis (Cafri et al., 2005; Stice, 2002; Stice & Agras, 1998). While male body image has received considerably less research attention, extant studies indicate that internalization of the muscular-ideal is significantly associated with increased body dissatisfaction, negative affect, and unhealthy behaviors aimed at increasing muscle size (Karazsia & Crowther, 2008; Thompson et al., 2012).

Given the mounting evidence regarding the importance of sociocultural pressures and internalization of appearance ideals to the development of body image disturbance and eating pathology, accurate assessment of these constructs is needed. The Sociocultural Attitudes Towards Appearance Questionnaire (Heinberg, Thompson, & Stormer, 1995) is one of the most widely-used measures of sociocultural factors that contribute to an acceptance of prevailing appearance ideals (Thompson et al., 2012). Over the years, as researchers' understanding of both the nature of sociocultural influences and the process by which they affect body image has grown, the SATAQ has been modified and updated in order to remain contemporaneous. Currently, the measure is in its third iteration (SATAQ-3; Thompson, Roehrig, van den Berg, Heinberg, & Guarda, 2004). The SATAQ-3 contains four subscales assessing internalization of appearance ideals promulgated by the media (Internalization-General subscale, example item: "I would like my body to look like the models who appear in magazines"), internalization of

athletic appearance ideals (Internalization-Athlete subscale, example item: “I wish I looked as athletic as sports stars”), pressure from the media to adhere to popular appearance ideals (Pressures subscale, example item: “I’ve felt pressure from TV or magazines to look pretty”), and the media as a source of information regarding societal standards of attractiveness (Information subscale, example item: “TV programs are an important source of information about fashion”). The psychometric properties and convergent validity of the measure are well-established in women and have been replicated in several investigations, including cross-culturally and among American women of various racial/ethnic backgrounds (Cafri et al., 2005; Calogero, Davis, & Thompson, 2004; Stefanile, Matera, Nerini, & Pisani, 2011; Thompson et al., 2012; Warren, Gleaves, & Rakhkovskaya, 2013).

In the years following the publication of the SATAQ-3, it has become apparent that there are limitations to the scale in its current form. First, the scale focuses exclusively on appearance-related pressures and ideals communicated through the media. As discussed above, a growing body of research suggests that family and peers are additional sources of appearance-related pressure. In its current form, the SATAQ-3 is not able to assess these important sources of sociocultural influence. Extant studies examining familial and peer pressures often assess specific forms of pressure (e.g., appearance-based teasing or “fat talk”), however, the choice of constructs or measures to be included often varies from study to study, somewhat complicating a comparison of findings. The addition of items to uniformly assess appearance-related pressures from peers, family, and the media would be a valuable improvement, allowing for the measurement and comparison of these influences within a single instrument.

Second, items from the Internalization-General and Internalization-Athlete subscales of the SATAQ-3 broadly assess internalization of appearance ideals promulgated through the media

and a desire to attain a physique similar to prominent athletes. However, items do not specifically assess internalization of core physical attributes associated with the thin-ideal (i.e., thinness, low body fat) and internalization of the muscular-ideal (i.e., muscularity and an athletic build). Currently, researchers use the Internalization-General subscale as a measure of thin-ideal internalization, however this relies heavily on the assumption that all respondents interpret items referring to media ideals as referencing a thin body type (an assumption that may not be tenable) and adds ambiguity to the interpretation of study findings. In addition, as the SATAQ-3 was originally developed for use with females exclusively, items reflect appearance concerns that are inappropriate for use with male samples (e.g., pressure to look “pretty”). To address this issue, researchers have modified items to address appearance concerns more relevant to males (i.e., muscularity) and have demonstrated significant relations between the modified scale and negative outcomes (Karazsia & Crowther, 2008). However, the psychometric properties of the modified scale have not been rigorously tested. Inclusion of items that specifically assess established dimensions of appearance ideals and body concerns for men and women would allow researchers to more carefully examine the relationship between thin-ideal/muscular-ideal internalization and proposed negative outcomes (e.g., body dissatisfaction and eating disturbance).

Accordingly, the purpose of the current investigation was to revise the SATAQ-3 to a) provide a more comprehensive evaluation of societal pressures by including items to assess family, peer, and media appearance-related pressures, b) develop a more focused measure of thin-ideal and muscular-ideal internalization, and c) systematically evaluate the reliability and convergent validity of scores on the new measure in female and male samples, and cross-culturally.

General Method

Three main studies were conducted to revise the SATAQ-3 and provide a comprehensive assessment of the revised measure, labeled the SATAQ-4, across a diverse range of samples. In the first study, four independent samples of college females drawn from distinct geographical regions within the United States were utilized in the development and validation of the SATAQ-4. Exploratory and confirmatory factor analyses were conducted using the largest independent sample to examine the factor structure of the preliminary SATAQ-4 and to guide item deletion. The resulting five-factor scale was then cross-validated in the remaining three samples of college women. Following identification and replication of the scale structure, the reliability and convergent validity of the SATAQ-4 scores were examined in each of the four US female samples. In Study 2, the factor structure, reliability, and convergent validity of SATAQ-4 scores were examined in an international sample of women from Italy, England, and Australia. Finally, Study 3 examined the factor structure, reliability, and convergent validity of SATAQ-4 scores in a sample of college males from the US. As research indicates that body dissatisfaction, eating pathology, and the influence of sociocultural pressures may increase through adolescence and decline in adulthood (Harriger, Calogero, Witherington, & Smith, 2010; Harris & Carr, 2001; Heatherton, Mahamedi, Striepe, Field, & Keel, 1997; Jones, Bennett, Olmsted, Lawson, & Rodin, 2001; Polivy & Herman, 1985), each sample in the current investigation was limited to individuals between the ages of 18 and 30 in order to maintain consistency in this important demographic factor and to target individuals who are likely to experience heightened body image and eating concerns.

Study 1: Item Generation, Identification and Cross-Validation of Factor Structure, and Reliability and Convergent Validity in US Female Samples

Study 1 describes the procedures for SATAQ-4 item development, as well as subsequent procedures for the identification and refinement of the scale structure in US females. Exploratory factor analysis and confirmatory factor analysis were utilized to examine the structure of the SATAQ-4 and identify items for deletion. The factor structure of the resultant scale was then examined in three additional cross-validation samples of college women from the US. To examine potential racial/ethnic variation in the scale, the factor structure of the SATAQ-4 was also examined separately among Caucasian and non-Caucasian women. Next, the reliability and convergent validity of the SATAQ-4 scores were examined in all four samples of US females. Based on previous literature, we expected scores on the SATAQ-4 to exhibit medium to large positive associations with measures of eating disorder symptomatology, medium to large negative associations with measures of body satisfaction and small to medium negative associations with measures of global self-esteem. Finally, all US samples were combined and eating disorder symptomatology scores were used to group participants into “eating disturbed” and “healthy” subsamples based on established clinical cutoffs, which allowed for a comparison of SATAQ-4 subscale mean scores between individuals who express high levels of eating disturbance and those who do not. We expected individuals with elevated levels of eating disturbance to evidence significantly higher levels of internalization and appearance-related pressures.

Method

Item generation for SATAQ-4. An initial pool of 51 items (27 internalization, 24 pressures) was generated by the first five authors, cognizant of the limitations (see above) of the SATAQ-3. Consistent with the guidelines proposed by Clark and Watson (1995), the goal was to produce a comprehensive and exhaustive initial pool of items to assess the target constructs. Care

was also taken to ensure that item wording was simple, accessible to most age groups, and avoided complex or “double-barreled” structuring. Internalization items were written to assess internalization of the thin-ideal (9 items), internalization of the muscular-ideal (8 items), and a more general desire to be attractive or in good shape (10 items). Pressures’ items sought to assess one’s perception of receiving appearance-related pressures from peers (8 items), family (8 items), and the media (8 items). Where possible, items from the SATAQ-3 Internalization-General subscale and Pressures subscale were adapted for the SATAQ-4 to better capture the constructs of interest. For example, the SATAQ-3 Internalization-General item “I would like my body to look like the models who appear in magazines” was revised to read “I would like my body to look very thin” in order to provide a more targeted assessment of thin-ideal internalization. Similarly, the SATAQ-3 Pressures item “I’ve felt pressure from TV and magazines to be thin” was revised to read “I feel pressure from the media to look thinner,” which allows for a broader assessment of media influences. New items were created to assess internalization of the muscular-ideal and appearance-related pressures emanating from peers and family. Item content and wording were similar across the pressures’ subscales, varying only the source of the perceived pressure. Respondents were instructed to rate their agreement with each item using a 5-point Likert-type scale with response options of 1 (*definitely disagree*), 2 (*mostly disagree*), 3 (*neither agree nor disagree*), 4 (*mostly agree*), and 5 (*definitely agree*).

Participants and procedures. Participants for the exploratory factor analysis (EFA) and initial confirmatory factor analysis (CFA) were 859 female undergraduate students who were recruited through the online psychology research participant pool at a large Southeastern university. Statistical software was used to randomly divide the Southeastern sample approximately in half so that EFA could be conducted using one half of the sample ($n = 425$) and

the CFA conducted using the remaining half ($n = 434$). The factor structure established in the initial EFA and CFA was then cross-validated in three independent samples of college women from sites around the US. The cross-validation samples included students from the East Coast ($N = 440$), West Coast ($N = 304$), and North/Midwest ($N = 349$). Participants in each of the cross-validation samples were recruited through their university's undergraduate research subject pool. Demographic information for each sample is provided in Table 1.

All participants completed a set of questionnaires, which included the SATAQ-4 and self-report measures of eating disorder symptomatology, body satisfaction, and global self-esteem. Participants also completed a brief demographics questionnaire in which they were asked to indicate their age, ethnicity, height, and weight. Self-reported heights and weights were used to calculate each participant's body mass index (BMI; kg/m^2). All study questionnaires were administered either online or in person using paper and pencil format. Upon completion of the questionnaires, participants were debriefed and received course credit for their participation.

Measures.

Sociocultural Attitudes Towards Appearance Questionnaire-4 (SATAQ-4). The preliminary 51-item SATAQ-4 was used to assess internalization of appearance ideals and appearance-related pressures. Items were rated on a 5-point Likert scale ranging from 1 (*definitely disagree*) to 5 (*definitely agree*).

Multidimensional Body-Self Relations Questionnaire – Appearance Evaluation Subscale (MBSRQ-AE). The Appearance Evaluation subscale of the MBSRQ (Brown, Cash, & Mikulka, 1990) was used to measure body satisfaction. The MBSRQ-AE 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*. Higher scores indicate greater body

satisfaction, while lower scores are indicative of greater body dissatisfaction. Research supports the reliability and validity of MBSRQ-AE scores in both community and clinical samples (Cash, 2000). Internal consistency for this measure ranged from .89 to .91 in the current samples.

Eating Disorder Examination – Questionnaire (EDE-Q). The EDE-Q (Fairburn & Beglin, 2008) is a widely-used measure of disordered eating symptomatology. The measure consists of 22 items assessing the frequency of eating disordered thoughts and behaviors. Items are rated on a 7-point scale ranging from *no days* to *every day*. Higher scores on the EDE-Q indicate greater levels of eating pathology. EDE-Q scores have demonstrated good internal consistency in community samples (Peterson et al., 2007). In the current samples, internal consistency for the EDE-Q was .95 in all samples.

Rosenberg Self-Esteem Scale (RSES). The RSES (Rosenberg, 1965) is a widely-used measure of global self-esteem and general feelings of self-worth. The scale is comprised of 10 items scored on a 4-point Likert scale ranging from *strongly disagree* to *strongly agree*. Higher scores indicate higher self-esteem. Scores from the RSES have been shown to be reliable and valid (Sinclair, Blais, Gansler, Sandberg, Bistis, & LoCicero, 2010). Internal consistency in the current samples ranged from .87 to .93.

Statistical analysis. Within one half of the Southeastern sample, exploratory factor analysis using principal axis factoring and promax oblique rotation was used to examine the factor structure of the SATAQ-4 and identify any potential items for deletion. The number of factors to be retained was guided by the use of multiple criteria including an examination of the scree plot (Floyd & Widaman, 1995; Cattell, 1966), application of the Kaiser-Guttman criterion, which suggests that factors with eigenvalues equal to or greater than 1.0 be retained (Guttman, 1954; Kaiser, 1960), parallel analysis, which involves comparing the eigenvalues from the

observed data with the eigenvalues extracted from random data sets (1000 for the present study) with same number of cases and variables, and Velicer's minimum average partial (MAP) test, which involves finding the minimum number of components that results in the lowest average squared partial correlation for the original correlation matrix (O'Connor, 2000). Items with low primary factor loadings and cross-loading items were deleted. Low primary loadings were defined as a primary loading of .40 or less (Bosworth, Espelage, & Simon, 1999; Cicero, Kerns, & McCarthy, 2010; Floyd & Widaman, 1995; Ford, MacCullum, & Tait, 1986). Cross-loading items were defined as having a secondary factor loading of .30 or higher or having a small gap between the primary and secondary loading (i.e., less than .20 apart). Additionally, if one item was deleted from a given pressures scale (e.g., media), the same item was deleted from the other pressures scales (e.g., family and peers) in order to maintain consistency among the scales. The EFA was conducted using SPSS 20.0.

A CFA using maximum likelihood estimation was next conducted using the remaining half of the Southeastern sample to verify the factor structure obtained in the EFA. Multiple fit indices were examined to evaluate overall model fit. Comparative Fit Index (CFI) values of .90 or higher indicated good model fit (Bentler, 1990), while CFI values of .95 indicated excellent fit (Hu & Bentler, 1999). Root Mean Square Error of Approximation (RMSEA) values of .08 or less (Browne & Cudeck, 1993) and Standardized Root Mean Square Residual (SRMR) values of .05 or less (Byrne, 1998) indicated good model fit. The chi-square value was also examined, however, the statistic is highly influenced by sample size. With larger sample sizes, the chi-square will tend to be large, indicating poor model fit (Bentler & Bonnet, 1980; Jöreskog & Sörbom, 1993). Modification indices and theory were used to guide further item deletion in order to improve model fit. To cross-validate the factor structure identified with the Southeastern

sample, independent CFAs were performed within each of the three remaining samples (East Coast, West Coast, North/Midwest). Finally, the Southeastern CFA sample was combined with cross-validation samples and two CFAs were performed to examine the factor structure of the SATAQ-4 in US females who self-identified as Caucasian or non-Caucasian. CFAs were conducted using Mplus 6.12 (Muthén & Muthén, 2010). Missing data were handled using full information maximum likelihood (FIML).

Internal consistency reliability for each of the SATAQ-4 subscales was assessed using Cronbach's alpha. Alpha values of .70 or higher indicate acceptable internal consistency (George & Mallery, 2003). Convergent validity was assessed via Pearson product-moment correlation coefficients between the SATAQ-4 subscale scores and measures of eating disorder symptomatology, body satisfaction, and global self-esteem. According to Cohen (1988), a correlation of .1 is considered small, .3 is medium, and .5 or more is large. Assumptions of linearity were evaluated via examination of scatterplots of observed and predicted values; non-linearity is indicated by "bowing," or a lack of symmetry around a diagonal line in the scatterplot (Tabachnick & Fidell, 2007).

To further evaluate the construct validity of the SATAQ-4 scores, Eating Disorder Examination-Questionnaire established clinical cutoffs ($EDE-Q \geq 4.0$; Luce & Crowther, 1999) were used to divide the US sample into "healthy" and "eating disturbed" subsamples. Independent samples *t*-tests were then conducted to examine potential differences in the SATAQ-4 subscale scores between these two groups. Cohen's *d* (difference in the means divided by the pooled standard deviation) was calculated to quantify the effect size. According to Cohen (1988), a *d* of 0.2 is considered small, 0.5 is medium, and 0.8 or more is large.

Results and Discussion

Exploratory factor analysis. The initial EFA using one half of the Southeastern sample resulted in 10 factors with eigenvalues greater than one. However, examination of the scree plot suggested a five- or seven- factor solution, while the results of the parallel analysis and MAP test indicated seven and eight factors, respectively. Given this lack of consensus, each factor solution was initially examined. Examination of the eight-, seven-, and five- factor solutions indicated numerous cross-loadings with several factors that were not clearly interpretable (i.e., the set of items contained therein did not represent a single clear construct and did not conform to theoretical expectations). Examination of the 10-factor solution provided greater clarity in factor interpretation. Given problems associated with the underextraction of factors (Zwick & Velicer, 1986), the 10-factor solution was utilized in the remaining analyses. A total of 13 items were deleted due to low primary factor loadings and cross-loading. The remaining 38 items were analyzed with a second EFA. This analysis resulted in seven factors with eigenvalues greater than one. The pattern matrix revealed two cross-loading items. In addition, two factors were comprised of only two items and were not clearly interpretable. Based on a lack of theoretical clarity in these factors and guidelines suggesting that factors with fewer than three items should be deleted (Jöreskog & Sörbom, 1989), these two factors were eliminated and a total of six items were deleted. The remaining 32 items were analyzed with a third EFA. This analysis resulted in a five-factor solution. All items loaded strongly onto their primary factor, each factor was clearly interpretable, and there were no cross-loading items. The first factor was comprised of six items reflecting a desire to attain a thin figure with little body fat. This factor was labeled *Internalization: Thin/Low Body Fat*. The second factor was comprised of eight items reflecting a desire to attain a muscular or athletic figure. This factor was labeled *Internalization: Muscular/Athletic*. The final three factors (*Pressures: Peers, Pressures: Family, Pressures:*

Media; six items each) reflected perceived sociocultural pressures from each of these social agents to improve one's appearance and attain an ideal physique. Notably, all general appearance internalization items were deleted in the EFA process due to high cross-loadings onto other scales.

Confirmatory factor analysis. The five-factor structure identified via EFA was next evaluated through CFA using the remaining half of the Southeastern sample. The initial CFA indicated poor model fit according to the CFI and marginal fit according to the SRMR and RMSEA; $\chi^2 = 1897.59, p < .001, CFI = .88, RMSEA = .09, SRMR = .06$. Therefore, the modification indices produced by the CFA were examined to determine the source of misfit. Modification indices indicated misfit resulting from correlated item errors. Correlated errors represent shared variance between two items that is not accounted for by the latent factor. When correlated errors exist, they may be either modeled statistically or one item in the pair may be eliminated to improve model fit (Muthén & Muthén, 2010). In the current sample, the largest modification indices were produced by pairs of items contained within the same subscale that shared similar wording and item content (e.g., "I want my body to look like it has little fat" and "It is important for me to look like I have very little body fat"), suggesting that one item in the pair may be deleted to reduce unnecessary redundancy in the scale without damaging item content coverage. The procedure used for item deletion was as follows: The 32-item SATAQ-4 was entered into the CFA, the fit indices were noted, and the largest resulting modification index was identified. Each of the two items was reviewed carefully to examine other psychometric concerns associated with the item (i.e., additional modification indices involving the item) and to determine which item in the pair provided the strongest coverage of the relevant construct of interest. Care was taken to ensure an equal number of items within each of the two

Internalization subscales and within the three *Pressures* subscales. After reviewing the two items, one item in the pair was deleted from the scale, the newly adjusted scale was re-entered into the CFA, and the procedure was repeated. Item deletion ceased when the criteria for each of the fit indices were met and there were an equivalent number of items within the *Internalization* and *Pressures* subscales, respectively. Through this process, 10 items were deleted. This analysis resulted in a 22-item scale that demonstrated excellent model fit according to the CFI and good fit according to RMSEA and SRMR ($\chi^2 = 489.41$ ($p < .001$), CFI = .96, RMSEA = .06, SRMR = .04). See Table 2 for the final set of 22 items contained within the five-factor scale. In females the *Internalization: Thin/Low Body Fat* subscale is comprised of five items (items 3, 4, 5, 8, 9). The *Internalization: Muscular/Athletic* subscale is also comprised of five items (items 1, 2, 6, 7, 10). The *Pressures: Family* subscale contains four items (items 11-14). The *Pressures: Peers* subscale contains four items (items 15-18). Finally, the *Pressures: Media* subscale contains four items (items 19-22). Table 3 presents the intercorrelations among the SATAQ-4 subscales for the full Southeastern sample.

Cross-validation CFAs. Fit indices for each of the three cross-validation sites are provided in Table 4. CFAs on the data from the East Coast, West Coast, and North/Midwest samples demonstrated good model fit.

Racial/Ethnic subgroup CFAs. Fit indices for each of the two racial/ethnic subgroups are provided in Table 4. Model fit was good across both subsamples, suggesting that the five-factor 22-item scale structure is appropriate for women who identify as Caucasian and non-Caucasian.

Internal consistency and convergent validity. Cronbach's alpha values for the SATAQ-4 subscales are presented in Table 4. For all US female samples, reliability of the

SATAQ-4 subscale scores was good at .82 or higher. Pearson product moment correlations between the SATAQ-4, and all convergence measures are presented in Table 5. Examination of scatterplots indicated linear relations between all variables. Generally, the SATAQ-4 subscale scores correlated with scores on measures of eating disorder symptomatology, body satisfaction, and global self-esteem in the hypothesized direction and association strength in all five samples. For all subscales except the *Internalization: Muscular/Athletic* subscale there was a medium to large positive association with eating disorder symptomatology, a medium negative association with body satisfaction, and a small to medium negative association with global self-esteem. Notably, in the all-female samples, scores on the *Internalization: Muscular/Athletic* subscale did not significantly correlate with body satisfaction or global self-esteem and exhibited only small positive correlations with eating disorder symptomatology. This finding is expected in light of research indicating that the appearance ideals of muscularity and athleticism are less relevant to women than they are to men (Brown & Slaughter, 2011; Cafri, Strauss, & Thompson, 2002; Dunn, Lewis, & Patrick, 2010; Field et al., 1999; Pope, Phillips, & Olivardia, 2000; Striegel-Moore & Franko, 2002; Thompson & Cafri, 2007). Overall, these data provide support for the reliability and convergent validity of the SATAQ-4 scores in women from the United States.

Mean subscale scores for the combined US sample are presented in Table 6. The results from the independent *t*-tests examining mean level differences between healthy participants and participants with eating disturbance on SATAQ-4 subscale scores are presented in Table 7. Significant differences were observed across all scales, such that eating disturbed participants exhibited higher levels of appearance ideal internalization and perceived sociocultural pressures compared to healthy participants. There was a large effect for group differences on the *Internalization: Thin/Low Body Fat* subscale, a medium effect on all *Pressures* subscales, and a

small effect on the *Internalization: Muscular/Athletic* subscale. In light of previous work suggesting that individuals with eating disorders exhibit increased levels of sociocultural pressures and internalization (Thompson et al., 2003), these results further support the construct validity of the SATAQ-4 scores.

Study 2: Validation of the SATAQ-4 in Non-US Females

In Study 2, the factor structure, reliability, and convergent validity of the SATAQ-4 scores were examined in a combined sample of women drawn from three Western countries that evidence shared sociocultural ideals for men and women, as well as similar rates of body image and eating disturbance (Hoek & van Hoeken, 2003; Wade, Bergin, Tiggemann, Bulik, & Fairburn, 2006).

Method

Participants and procedures. Study 2 examined a combined sample ($N = 362$) of women from Italy, England, and Australia. The sample was comprised of 159 undergraduate women drawn from a university in Italy, 110 undergraduate ($n = 62$) and community ($n = 48$) women from England, and 93 undergraduate women drawn from a university in Australia. Participants provided informed consent and completed questionnaires in hard-copy format. Demographic characteristics for the sample are presented in Table 1. All participants completed a brief demographics questionnaire, the SATAQ-4, the EDE-Q, the MBSRQ-AE, and the RSES (see Study 1 for a full description of these measures). For data collected in Italy, the SATAQ-4 was first translated into Italian by two bilingual researchers and then back-translated into English by a separate native Italian speaker to ensure accuracy. Italian versions of convergent measures were also utilized (Mannucci, Ricca, Di Bernardo, Rotella, 1996; Prezza, Trombaccia, Armento,

1997). In the current sample, Cronbach's alpha for the EDE-Q was .96, alpha for the MBSRQ-AE was .91, and alpha for the RSES was .90.

Statistical analysis. CFA using full information maximum likelihood estimation was conducted with sample to confirm the final 22-item, five-factor structure of the SATAQ-4. See Study 1 for a discussion of model fit criteria. Reliability for the SATAQ-4 subscale scores was assessed using Cronbach's alpha. Convergent validity was assessed via Pearson product-moment correlation coefficients. Finally, subscale mean scores were calculated for the non-US female sample.

Results and Discussion

The CFA on the SATAQ-4 in the non-US sample demonstrated good model fit. Fit indices and results from the reliability analyses are shown in Table 4. The SATAQ-4 subscale scores demonstrated good internal consistency ($\alpha = .84$ or higher) in the sample. Results from the convergent validity analyses are presented in Table 5. Similar to the US samples, scores on the SATAQ-4 subscales generally demonstrated medium to large positive associations with eating disorder symptomatology scores, medium negative associations with body satisfaction scores, and small negative associations with global self-esteem scores. As in the US samples, scores on the *Internalization: Muscular/Athletic* subscale demonstrated only weak and often non-significant relationships with scores from convergent measures. Again, this result may be expected, given the composition of the all-female sample and extant research suggesting that women desire a slender physique while men desire a more muscular physique (Striegel-Moore & Franko, 2002; Thompson & Cafri, 2007). Table 6 presents subscale means for the international sample.

Study 3: Factor Structure, Reliability, Convergent Validity, and Mean Comparisons in US Male Sample

In Study 3, the factor structure, reliability, and convergent validity of the SATAQ-4 scores were examined in a sample of male college students from the US.

Method

Participants and procedures. Participants were 271 college males drawn from the undergraduate research participant pools at universities in the West Coast ($n = 111$), Southeast ($n = 101$), and North/Midwest ($n = 59$). Demographic characteristics of the sample are presented in Table 1. All participants completed the SATAQ-4 and self-report measures of eating disorder symptomatology, body satisfaction, and global self-esteem (described in Study 1). In the current sample, Cronbach's alpha for the EDE-Q was .74; it was .91 for the MBSRQ-AE; and, it was .90 for the RSES.

Statistical analysis. When examining the factor structure of a scale in a novel sample within which the scale structure may differ, Thompson (2004) suggests that EFA is preferred over CFA. Research indicates that the factor structure of body image measures may vary significantly between male and female samples (Smolak, Levine, & Thompson, 2004; Wheeler, Vassar, & Hale, 2011) as a result of gender differences in body image concerns. Consequently, many researchers utilize EFA procedures when initiating psychometric testing of body image measures in male samples (Jackson & Chen, 2010; Wilksch & Tracey, 2012). In the current study, an EFA was chosen over a CFA (see Study 1 for full description of EFA procedures) because it was possible that items assessing a desire for low body fat (originally contained within the *Internalization: Thin/Low Body Fat* subscale in the female samples) could load on to either of the two *Internalization* subscales in men as leanness is generally considered to be part of the

muscular ideal. As in Study 1, parallel analysis and Velicer's MAP test were conducted to identify the appropriate factor structure. The reliability and convergent validity of SATAQ-4 scores in men were examined using the same data analytic procedures described in Study 1. Subscale means were calculated for the male sample.

Results and Discussion

Results from the exploratory factor analysis in the male sample indicated five factors with eigenvalues greater than one. The scree plot also suggested a five-factor solution. Results of the parallel analysis suggested four factors while the results of the MAP test suggested five factors. Examination of the pattern matrix indicated that the factor structure and item loadings identified in Study 1 were largely replicated in the male sample (see Table 2). All but three items from the *Internalization: Thin/Low Body Fat* subscale exhibited strong loadings onto the expected factor (all primary loadings .53 or higher). Item 4 ("I want my body to look like it has little fat") exhibited low factor loadings across all subscales, however, it loaded most strongly (.25) onto the expected factor. Item 8 ("I want my body to look very lean") exhibited a strong loading onto its primary factor (.44), but cross-loaded (.30) onto the *Internalization: Muscular/Athletic* subscale. Item 9 ("I think a lot about having very little body fat") also exhibited a strong loading onto its primary factor (.62), but cross-loaded (.31) onto the *Internalization: Muscular/Athletic* subscale. The cross-loading of items 8 and 9 onto the *Internalization: Muscular/Athletic* subscale is perhaps not surprising given that appearance ideals for men emphasize both muscularity and leanness (Karazsia & Crowther, 2008). Therefore, the desire to be lean may be slightly more closely associated with muscularity in male samples than in female samples.

Cronbach's alpha for the SATAQ-4 subscale scores were acceptable at .75 or higher (see Table 4). Scores on the SATAQ-4 subscales demonstrated small to medium positive associations with measures of disordered eating, and small to medium negative associations with measures of body satisfaction and self-esteem (see Table 5). It is notable that the *Internalization: Thin/Low Body Fat* subscale demonstrated stronger associations with eating pathology, body satisfaction, and self-esteem than the *Internalization: Muscular/Athletic* subscale suggesting that even among males a desire to obtain a thin figure may be a stronger risk factor for eating pathology than a desire to obtain a muscular figure. Notably, items in the EDE-Q focus largely on shape concerns and a desire to lose weight or decrease one's intake (concerns closely aligned with a desire for thinness). It is possible that other measures of eating pathology with a lesser focus on these symptoms may show a different pattern of relations with the *Internalization* subscales in men. Additionally, researchers have noted that differences in standards of physical attractiveness for men and women (i.e., thinness versus muscularity) are likely to lead to different psychological sequela (McCreary, 2007). While internalization of the thin ideal is likely to lead to attempts to restrict one's intake in order to effect weight loss, internalization of the muscular ideal may be more strongly associated with drive for muscularity (i.e., one's motivation to become muscular), unhealthy behaviors aimed at building muscle (e.g., extreme dieting or weight training, use of supplements or steroids), muscle dysmorphia, or cosmetic surgery (McCreary & Sasse, 2002; Thompson & Cafri, 2007). Table 6 presents subscale means for the male sample.

General Discussion

This article describes the development and initial validation of SATAQ-4 scores in women and men. Building upon the utility of previous versions of the SATAQ in assessing sociocultural risk factors for body dissatisfaction and eating pathology, the current revision seeks

to provide a more targeted assessment of internalization of appearance ideals relevant to women and men (i.e., thin and muscular ideals) and to expand the scope of the pressures' subscales by including items to assess appearance-related pressures from a variety of established sociocultural sources (i.e., peers, family, and media). The factor structure of the SATAQ-4 was confirmed in four US samples and one combined international sample of women from three countries, as well as in subsamples of women from Caucasian and non-Caucasian racial/ethnic groups. Exploratory factor analysis of the scale in males indicated that the factor structure identified in females was largely replicated in males. In addition, the studies provide preliminary support for the reliability and validity of the SATAQ-4 scores in women and men. Across all samples, internal consistency for the SATAQ-4 subscale scores was acceptable to excellent. In each of the female samples, scores on the *Internalization: Thin/Low Body Fat* subscale and all three *Pressures* subscales exhibited significant positive associations with measures of disordered eating and significant negative associations with measures of body satisfaction and self-esteem. The *Internalization: Muscularity/Athletic* subscale correlated positively with disordered eating scores, but was not significantly related to body satisfaction or self-esteem scores. The pattern of relations between scores on the SATAQ-4 and convergent measures was largely replicated in the male sample with the notable exception that scores on the *Internalization: Muscularity/Athletic* subscale were significantly negatively associated with body satisfaction scores.

The SATAQ-4 improves on previous versions of the scale in several important ways. The SATAQ-4 is the first measure to assess internalization of appearance ideals implicated in the development of body dissatisfaction and disordered eating in women and men. While previous versions of the scale contained items to assess internalization of appearance ideals portrayed in the media, the creation of a specific internalization subscale for the assessment of thinness and

low body fat in the SATAQ-4 is a significant improvement over the SATAQ-3 as it is now possible to more precisely measure the association between thin-ideal internalization and eating disturbances. Similarly, the creation of a subscale to assess a desire for muscularity and an athletic physique improves on the SATAQ-3's Internalization-Athlete subscale by providing a more specific assessment of muscular-ideal internalization. Thus the SATAQ-4 captures an emerging appearance ideal that is especially relevant to men and which may be associated with unhealthy appearance attitudes and behaviors (Thompson & Cafri, 2007).

The SATAQ-4 also expands the measurement of sociocultural pressures implicated in the etiology of body dissatisfaction and eating pathology. While the SATAQ-3 provides a singular assessment of appearance-related pressures from the media, the SATAQ-4 includes new pressures subscales to assess familial and peer pressure, two formative influences on body image that have received strong empirical support (Keery et al., 2004; Shroff & Thompson, 2006; van den Berg, Thompson, Obremski-Brandon, & Coovert, 2002). An additional advantage of these subscales in their current format is that the item wording is equivalent across subscales (changing only the source of the perceived pressure), which allows researchers to directly compare the roles of peers, family, and media in the onset and/or maintenance of body image and eating disturbances.

Limitations of the current investigation indicate several avenues for future research. One of the limitations of the current study is the potential for method effects (i.e., inflated associations between variables due to common method variance) given the exclusive use of questionnaires. Future work may seek to examine the association between SATAQ-4 subscales and hypothesized correlates assessed via interview. Although several items were written to assess a more general desire to be attractive (rather than a specific desire to be thin or muscular),

general attractiveness did not emerge as a distinct dimension in factor analytic procedures.

Although not as relevant a body image dimension for much of the work in the area of eating disorders, a general attractiveness internalization scale would be useful for areas of inquiry such as overall appearance dissatisfaction, body dysmorphic disorder, and engagement in cosmetic surgery (Menzel et al., 2011). It is possible that these items need to be revised to be more distinct from the other two areas of internalization. Although this investigation attempted to examine the construct validity of SATAQ-4 scores via convergent validity analyses and examination of subscales scores in healthy versus eating disturbed subsamples, the studies are limited by the lack of a discriminant validity measure and the lack of convergent validity measures that would be especially relevant for the *Internalization: Muscularity/Athletic* subscale (e.g., the Drive for Muscularity Scale; McCreary & Sasse, 2000). Future work should address these issues. In addition, the current investigation is limited by the demographic characteristics of the samples and findings may not generalize to other groups. While the current article provides preliminary evidence to support the psychometric properties of the measure in college women from the US and abroad, future work with women should strive to examine the SATAQ-4 with younger/older females, among diverse ethnic groups, and within additional countries where eating disorders and body image are a growing concern. As this is the first paper to begin exploration of the SATAQ-4 in males, exploratory factor analysis was utilized as a first step in examining scale structure. Future work should strive to build on these findings by utilizing confirmatory factor analytic techniques and measurement invariance testing to examine similarity in item functioning across genders. Given that three items from the *Internalization: Thin/Low Body Fat* subscale cross-loaded onto the *Internalization: Muscularity/Athletic* subscale, it is likely that the factor structure of the scale may differ somewhat for males. It is possible that a Muscularity/Low-Body

Fat subscale may be more appropriate for use with men; scores from such a subscale would likely exhibit stronger associations with convergent measures. Future work should also continue to investigate the psychometric properties of the SATAQ-4 in more diverse samples of males. As a large body of evidence indicates that internalization of appearance ideals is a risk factor for body image and eating disturbance, future work is needed to examine the utility of the SATAQ-4 in identifying young women and men who may be at risk for the development of disturbed eating. Similarly, as eating disorder prevention programs aimed at reducing levels of internalization have been shown to be effective at reducing onset of eating disturbance (Stice, Marti, Poor, Presnell, & Shaw, 2008) future work may aim to examine the sensitivity of the SATAQ-4 in detecting treatment effects.

Finally, high rates of overweight and obesity in the United States and elsewhere (World Health Organization, 2000) have driven research interest in the identification of risk factors implicated in the development and maintenance of overweight and obesity. Extant research suggests that appearance pressures (e.g., weight-based teasing, weight stigma) increases risk for reduced physical activity, increased food consumption or binge eating, and unhealthy weight control behaviors, which may serve to maintain elevated weight status (Haines, Neumark-Sztainer, Wall, & Story, 2007; Neumark-Sztainer, 2005; Schvey, Puhl, & Brownell, 2011; Stice, Cameron, Killen, Hayward, & Taylor, 1999; Thompson et al., 2012). Thus, future research may seek to examine the relation between SATAQ-4 scores and weight-status, both cross-sectionally and prospectively.

In sum, the current iteration of the SATAQ offers several advantages over the previous versions and may aid in the more precise determination of the relations among sociocultural risk factors, body image disturbance, and eating disturbance. The current investigation provides

strong evidence for the reliability and validity of SATAQ-4 scores in American, Italian, Australian, and English women. Additionally, preliminary analyses of the scale in American men suggest the SATAQ-4 is a useful tool for examining societal and interpersonal aspects of appearance ideals, though additional testing in males is needed. Overall, future research directions indicate the need for additional testing, item development, and psychometric analyses in diverse samples.

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