Brief research report
Evidence for the Body Appreciation Scale's measurement equivalence/invariance between U.S. college women and men

Tracy L. Tylka*
Department of Psychology, Ohio State University, Columbus and Marion Campuses, United States

ARTICLE INFO
Article history:
Received 17 November 2012
Received in revised form 16 February 2013
Accepted 19 February 2013

Keywords:
Body Appreciation Scale
Measurement invariance
Positive body image
Construct validity
College women
College men

ABSTRACT
Considered a measure of positive body image, the Body Appreciation Scale (BAS; Avalos et al., 2005) assesses acceptance of, favorable opinions toward, and respect for the body. Although the BAS was originally developed for and psychometrically examined with women, researchers are administering it to men and making gender comparisons. However, tests of measurement equivalence/invariance are needed to determine whether the BAS operates similarly for women and men. Therefore, in the present study, the BAS’s cross-gender configural, factor loading, and intercept invariance was examined among 930 college women and men. The BAS demonstrated measurement equivalence/invariance between women and men, suggesting that gender comparisons can be made with confidence. Additional evidence was accrued for the convergent validity of the male version of the BAS, as it was related to men’s dissatisfaction with muscularity, body fat, and height. These findings reinforce the structural and construct integrity of the BAS.

© 2013 Elsevier Ltd. All rights reserved.

Introduction

In the second edition of Body Image: A Handbook of Science, Practice, and Prevention, Smolak and Cash (2011, p. 472) asserted that research “focusing on positive, adaptive, or healthy body image is essential to the future of the field.” The Body Appreciation Scale (BAS; Avalos, Tylka, & Wood-Barcalow, 2005) shows promise as a measure to guide this research (Tylka, 2011). The BAS measures holding favorable opinions of the body regardless of actual appearance, accepting the body despite weight/shape or perceived imperfections, respecting the body by attending to its needs and engaging in healthy behaviors, and protecting the body by rejecting unrealistic media images. It was designed for and psychometrically evaluated with samples of women; however, Avalos et al. offered, but did not evaluate, a slightly modified male version in which “muscular images of men” replaces “thin images of women” for one item.

Much validity evidence has been garnered for the BAS among Western (i.e., U.S., British, and German-speaking) samples of women. Its unidimensional factor structure was upheld via exploratory and confirmatory factor analyses (EFA and CFA; Avalos et al., 2005; Swami, Stieger, Haubner, & Voracek, 2008). The BAS is correlated with many body image indices—it is positively related to women’s appearance evaluation and body esteem and inversely related to women’s body dissatisfaction, body preoccupation, body surveillance, body shame, social physique anxiety, body shape concerns, body image avoidance, and body checking (Avalos et al., 2005; Swami et al., 2012). The BAS is positively linked to women’s psychological well-being, such as self-esteem, optimism, life satisfaction, positive affect, and proactive coping (Avalos et al., 2005; Swami, Airs, Chouhan, Leon, & Towell, 2008), and negatively linked to their psychological distress, such as negative affect, neuroticism, maladaptive perfectionism, thin-ideal internalization, and attachment anxiety (Avalos et al., 2005; Iannantuono & Tylka, 2012; Swami, Hadji-Michael, & Furnham, 2008; Swami et al., 2012; Tylka & Kroon Van Diest, 2013). Behaviorally, the BAS is positively related to women’s intuitive eating (Augustus-Horvath & Tylka, 2011) and sexual arousal and satisfaction (Satinsky, Reece, Dennis, Sanders, & Bardzell, 2012) and inversely related to their consideration of cosmetic surgery (Swami, 2009), drive for thinness (Swami et al., 2012), and eating disorder symptomatology (Avalos et al., 2005). Interpersonally, women’s BAS scores are linked to body acceptance and avoidance of food restriction from caregivers (Kroon Van Diest & Tylka, 2010).

Four abovementioned studies also accrued validity evidence for Avalos et al.’s (2005) male version with samples of men from Western cultures. An EFA revealed that the BAS has a unidimensional factor structure among British men (Swami, Stieger, et al., 2008). The BAS is related to select indices of men’s body image—body esteem (i.e., sexual attractiveness, upper body strength satisfaction,
and physical condition) in a positive direction and body shame and surveillance in a negative direction (Swami, Stieger, et al., 2008; Tylka & Kroon Van Diest, 2013). The BAS is linked to men's psychological well-being, namely self-esteem, instrumentality, life satisfaction, and positive affect in a positive direction and neuroticism and negative affect in an inverse direction (Swami, Hadji-Michael, & Furnham, 2008; Swami, Stieger, et al., 2008; Tylka & Kroon Van Diest, 2013). Behaviorally, men's BAS scores are positively related to intuitive eating and inversely linked to eating disorder symptomatology and media consumption (Swami, Hadji-Michael, & Furnham, 2008; Tylka & Kroon Van Diest, 2013). Interpersonally, caregivers' body acceptance and avoidance of food restriction predict men's BAS scores (Kroon Van Diest & Tylka, 2010). In three of these four studies, the authors concluded that men have higher mean BAS scores than women.

Yet, mean BAS score comparisons between women and men may not be valid. When comparing a measure between groups, a critical assumption is that the scale assesses the same latent construct—only if this assumption holds are group comparisons valid. To test this assumption, it is necessary to examine a scale's measurement equivalence/invariance (ME/I), which can be performed via multiple-group CFA. Although the BAS's unidimensionality has been upheld for British women and men in separate EFAs (Swami, Stieger, et al., 2008), EFAs cannot determine ME/I because they do not estimate latent constructs (Reise, Widaman, & Pugh, 1993). Specifically, tests of ME/I determine whether (a) a similar latent variable is present for women and men as determined by the parameter patterns across groups (configural invariance); (b) the loadings for items on the latent factor are the same for women and men (factorial invariance), and (c) the intercept of the regression relating each item to the latent factor is the same for women and men ( intercept invariance). If these ME/I criteria are not supported, then differences between women's and men's BAS scores are artifactual. Thus, this study's primary purpose was to examine the BAS's ME/I between women and men.

Most studies exploring the relationship between the BAS and body image with men have used body image instruments developed for women. Thus, the second aim of this study was to determine whether the BAS is related to men's dissatisfaction with their muscularity, body fat, and height—three central aspects of men's body image assessed using the Male Body Attitudes Scale, which was developed specifically for men (Tylka, Bergeron, & Schwartz, 2005). The BAS was hypothesized to be inversely related to men's muscularity, body fat, and height dissatisfaction, thereby garnering evidence for its convergent validity.

### Table 1

<table>
<thead>
<tr>
<th>BAS item</th>
<th>Women</th>
<th>Men</th>
<th>t</th>
<th>Item-factor loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>1. I respect my body.</td>
<td>3.89</td>
<td>0.94</td>
<td>4.06</td>
<td>0.84</td>
</tr>
<tr>
<td>2. I feel good about my body.</td>
<td>3.25</td>
<td>0.98</td>
<td>3.76</td>
<td>0.94</td>
</tr>
<tr>
<td>3. On the whole, I am satisfied with my body.</td>
<td>3.27</td>
<td>1.12</td>
<td>3.73</td>
<td>1.02</td>
</tr>
<tr>
<td>4. Despite its flaws, I accept my body for what it is.</td>
<td>3.58</td>
<td>1.14</td>
<td>4.01</td>
<td>0.99</td>
</tr>
<tr>
<td>5. I feel that my body has at least some good qualities.</td>
<td>4.04</td>
<td>0.91</td>
<td>4.29</td>
<td>0.80</td>
</tr>
<tr>
<td>6. I take a positive attitude toward my body.</td>
<td>3.47</td>
<td>1.04</td>
<td>3.94</td>
<td>0.96</td>
</tr>
<tr>
<td>7. I am attentive to my body's needs.</td>
<td>3.83</td>
<td>0.91</td>
<td>3.96</td>
<td>0.84</td>
</tr>
<tr>
<td>8. My self-worth is independent of my body shape or weight.</td>
<td>3.49</td>
<td>1.10</td>
<td>3.69</td>
<td>1.10</td>
</tr>
<tr>
<td>9. I do not focus a lot of energy being concerned with my body shape or weight.</td>
<td>2.86</td>
<td>1.05</td>
<td>3.12</td>
<td>1.14</td>
</tr>
<tr>
<td>10. My feelings toward my body are positive for the most part.</td>
<td>3.37</td>
<td>1.09</td>
<td>3.88</td>
<td>0.96</td>
</tr>
<tr>
<td>11. I engage in healthy behaviors to take care of my body.</td>
<td>3.53</td>
<td>0.89</td>
<td>3.61</td>
<td>0.90</td>
</tr>
<tr>
<td>12. I do not allow unrealistically thin (muscular) images of women (men) presented in the media to affect my attitudes toward my body.</td>
<td>3.15</td>
<td>1.21</td>
<td>3.54</td>
<td>1.14</td>
</tr>
<tr>
<td>13. Despite its imperfections, I still like my body.</td>
<td>3.67</td>
<td>1.07</td>
<td>4.04</td>
<td>0.90</td>
</tr>
<tr>
<td>BAS overall mean</td>
<td>3.49</td>
<td>0.79</td>
<td>3.82</td>
<td>0.70</td>
</tr>
</tbody>
</table>

Note: Women, n = 527; men, n = 403. Item-factor loadings are based on the configural invariance analysis.

*p < .00385 (the p-value was adjusted for the number of comparisons, i.e., p = .05/13 = .00385).
and one with MBAS items) counterbalanced for men. Participants received course credit. Fifteen students who failed a validity question (“To make sure you are paying attention, please do not answer this item,” placed between the eighth and ninth BAS item) due to inattentiveness and six participants who did not complete at least 80% of the measures/measure were deleted. Because emerging and early adults have higher BAS scores than those in middle adulthood (Augustus-Horvath & Tylka, 2011), participants older than 39 were removed (n = 55). Also, given that culture and ethnicity may influence the BAS’s factor structure (Swami & Chamorro-Premuzic, 2008; Swami & Jaafar, 2012), non-White participants (n = 216) were deleted. These screening procedures reduced the data set from 1222 students who originally accessed the study to 930 participants included in the data set.

Results

Preliminary Analyses

Multiple imputation was used to estimate the few missing data points because they were missing completely at random (MCAR). Little’s MCAR test: \( \chi^2(132) = 127.94, p = .584 \). Skewness and kurtosis values for all items and mean scores were \(<|1.0|\), well below critical limits (skewness < |3.0| and kurtosis < |10.0|; Kline, 2010). Women and men did not differ in age, t(929) = 0.56, p = .578, or school rank, \( \chi^2(4, N = 930) = 0.90, p = .924 \). Table 1 includes BAS items, means, and standard deviations.

Tests of Measurement Invariance

Mplus Version 6.12 (Muthén & Muthén, 1998–2011), using CFA with maximum likelihood estimation, was used to test for configural, factor loading, and intercept invariance. Adequacy of model fit was determined via consensus among the comparative fit index (CFI), standardized root-mean square residual (SRMR), and root mean square error of approximation (RMSEA). CFI values around .95 and higher, SRMR values around .08 or lower, and RMSEA values around .06 and lower indicate a good fit of the model to the data. CFI values between .90 and .94, SRMR values between .09 and .10, and RMSEA values between .07 and .10 indicate an acceptable fit (Hu & Bentler, 1999).

For all models, each BAS item was specified to load on one factor. An error covariance was freely estimated between (a) Items 8 and 9—the only items that specifically reference “my body shape or weight,” (b) Items 7 and 11—the only items assessing behaviors rather than attitudes, and (c) Items 9 and 12—the only negatively worded items. Items within each of these pairs likely share unique method variance due to their similar wording, content, or directionality, and thus should be correlated within models (Brown, 2006; Kline, 2010). No other error covariance was estimated.

The configural invariance model provided an acceptable-to-good fit to the data (see Table 2), suggesting that the BAS has a single latent dimension for women and men. This model provides a comparison to determine factor loading invariance, and the factor loading invariant model provides a comparison to determine intercept invariance. For factor loading and intercept invariance, chi-square difference tests (\( \Delta \chi^2 \)) permit statistical comparisons between nested models. However, these tests are almost always statistically significant with large samples, and thus are unrealistic criteria to determine invariance (e.g., Byrne & Stewart, 2006; Chen, Sousa, & West, 2005). Chen (2007) recommends also exploring practical model fit changes: if \( \Delta \text{CFI} < .010 \), \( \Delta \text{RMSEA} < .015 \), and \( \Delta \text{SRMR} < .030 \) for tests of factor loading invariance, and \( \Delta \text{CFI} < .010 \), \( \Delta \text{RMSEA} < .015 \), and \( \Delta \text{SRMR} < .010 \) for tests of intercept invariance, then measurement invariance is evidenced.

The factor loading invariance model, which constrained all factor loadings to be equal between women and men, provided a good fit to the data (see Table 2), and did not differ from the configural model, \( \Delta \chi^2(12) = 15.18, p = .232 \). The fit indices (\( \Delta \text{CFI} = .000 \), \( \Delta \text{RMSEA} = .003 \), \( \Delta \text{SRMR} < .004 \) were well within Chen’s (2007) recommendations for factor loading invariance. Therefore, factor loadings were invariant between women and men.

The intercept invariance model, which constrained all intercepts to be equal between women and men, fit the data well (see Table 2), but differed significantly from the factor-loading invariant model, \( \Delta \chi^2(12) = 45.73, p < .001 \). Item-level analyses were performed to identify which item intercepts were non-invariant. After controlling for Type 1 error (\( p = .05/13 = .00385 \)), two intercepts were non-invariant: Item 1 intercept, \( \Delta \chi^2(1) = 13.48, p < .001 \) and Item 2 intercept, \( \Delta \chi^2(1) = 10.63, p < .001 \). Yet, the fit indices changed very little (\( \Delta \text{CFI} = .002 \), \( \Delta \text{RMSEA} = .001 \), \( \Delta \text{SRMR} = .001 \) for Item 1, \( \Delta \text{CFI} = .001 \), \( \Delta \text{RMSEA} = .000 \), \( \Delta \text{SRMR} = .001 \) for Item 2), indicating that the intercepts were largely invariant (Chen, 2007). Because the impact of the different intercepts for Items 1 and 2 was negligible, these two items were retained.

Item-level and Mean Gender Differences

Because ME/I was evidenced, BAS item and total scale mean gender differences were calculated. Using the Bonferroni correction (\( p = .05/13 = .00385 \)), women and men differed on eleven (85%) items and the BAS overall mean (see Table 1). Compared to women, men reported higher levels on items assessing favorable body attitudes, but similar levels between behavioral items (e.g., engaging in behaviors to take care of their bodies).

Convergent Validity Evidence for Men

BAS scores were correlated with men’s masculinity dissatisfaction (\( r = −.38 \)), body fat dissatisfaction (\( r = −.64 \)), height dissatisfaction (\( r = −.19 \)), and overall body dissatisfaction (\( r = −.61 \); \( ps < .001 \)). Thus, evidence was accrued for the BAS’s convergent validity with men.

Discussion

Investigating the BAS’s cross-gender ME/I revealed that it measures the same construct equivalently between women and men. Items loaded on the same factor (configural invariance), magnitudes of factor loadings were the same (factor loading invariance), and regression intercepts relating each item to the factor were similar (intercept invariance). Thus, women and men’s
mean BAS scores can be compared, and gender differences in BAS mean scores and relationships with other variables are not due to instrument artifacts. Mean differences on certain BAS items indicate that (a) men hold more positive body attitudes than women, which could be due to greater flexibility in appearance norms for men found throughout Western cultural contexts (Buote, Wilson, Strahan, Gazzola, & Papps, 2011) and (b) women and men engage in body-nurturing behaviors to a similar degree, which has not yet been addressed in the body image literature. Additionally, investigations into whether the BAS was inversely related to men’s dissatisfaction with their muscularity, body fat, and height revealed support for each of these associations, yielding evidence for the convergent validity of the BAS.

Strengths of this study include its large sample size and use of ME/I analyses to determine the viability and comparability of the BAS among women and men. However, this study was limited to examining one social identity variable in a homogenous sample in terms of geographic region (U.S.), age (emerging and early adults), and ethnicity (White). Researchers do not know whether the BAS demonstrates ME/I between ethnic, sexual orientation, and developmental status groups, which could be an area for further research.

Indeed, a 2-factor structure may best fit the data of individuals from non-Western cultures (Swami & Chamorro-Premuzic, 2008; Swami & Jaafar, 2012).

In conclusion, researchers and clinicians should be confident in the acceptability of comparing women’s and men’s BAS scores if the sample is predominantly young–adult White college students from a Western culture. Given body appreciation’s positive associations with psychological well-being and inverse associations with psychological distress (e.g., Swami, Stieger, et al., 2008; Tylka & Kroon Van Diest, 2013), it is imperative to detect those with low body appreciation—of which the BAS could be a helpful as a screening instrument—and develop and examine interventions to increase body appreciation.

References


