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An Examination of the Factor Structure and Preliminary Assessment of the Psychometric Properties of a Hebrew Translation of the Body Appreciation Scale-2 (BAS-2)

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**Abstract**

The Body Appreciation Scale-2 (BAS-2) is a widely-used, 10-item measure of a core facet of positive body image. To extend its use internationally, we examined the factor structure and conducted a preliminary assessment of the psychometric properties of a novel Hebrew translation of the BAS-2. A sample of 613 Israeli adults (362 women, 251 men; age *M*= 29.52, *SD* = 9.47) completed the BAS-2 alongside demographic items and previously-validated measures of life satisfaction, self-esteem, self-compassion, and body investment. Exploratory factor analyses with a semi-random split-half subsample (*n* = 377) indicated that BAS-2 scores reduced to a single dimension with all 10 items. This factor structure was equivalent across women and men. Confirmatory factor analysis (CFA) with a second split-half subsample (*n* = 235) showed the 1-dimensional factor structure had adequate fit following one modification and multi-group CFA showed that the model was invariant across sex. Men had significantly higher BAS-2 scores than women, but the effect size was small (*d* = 0.22). Evidence of construct validity was demonstrated through positive associations with indices of life satisfaction, self-esteem, self-compassion, and body investment. The availability of a validated BAS-2 Hebrew translation should advance future research of body appreciation in Israel.

**Keywords**: Body appreciation; Positive body image; Test adaptation; Psychometrics; Israel

**1. Introduction**

Body image refers to the multifaceted psychological experience of embodiment that encompasses one’s body-related self-perceptions and self-attitudes, including thoughts, beliefs, feelings, and behaviors (Cash, 2004), with discrete positive and negative dimensions that are conceptualized as independent constructs. That is, positive body image is not merely the absence of negative body image; rather, positive and negative body image are considered orthogonal and independent concepts (Tylka, 2011; Tylka, 2018; Tylka & Wood-Barcalow, 2015a). After years of focusing on negative aspects of body image, research interest in positive body image has grown substantially (Daniels et al., 2018; Tylka, 2018, 2019), revealing its unique adaptive and protective association, over-and-above negative body image, with a variety of psychological and physical health-related behaviors and viewpoints (e.g., Cook et al., 2020; Davis et al., 2020; Gillen, 2015; Swami et al., 2018). Therefore, consideration and enhanced focus on aspects of positive body image are essential to the provision of improved intervention strategies that promote health and well-being related to embodiment, as well as to prevent and treat body image disturbances (Guest et al., 2019; Tylka, 2018, 2019).

Positive body image has been defined as a multidimensional construct comprised of body appreciation, body acceptance and love, adaptive appearance investment, broad conceptualizing beauty, and filtering of information in a body protective manner (Tylka, 2018). One frequently conceptualized and measured construct of positive body image is body appreciation, which Tylka and Wood-Barcalow (2015b, p. 53) defined as “accepting, holding favorable opinions toward, and respecting the body, while also rejecting media-promoted appearance ideals as the only form of human beauty”. To measure the construct of body appreciation, Avalos and colleagues (2005) developed the Body Appreciation Scale (BAS), a 13-item scale that was initially found to reduce to a single dimension in adults from the United States. However, reproducing this 1-dimensional factor structure across different linguistic groups proved problematic, with a 2-factor structure being preferred in some groups (for a review, see Swami, 2018). Furthermore, issues such as different item wording for men or women on one item and outdated item/construct content, as well as a need to keep pace with developments in the conceptualization of the concept of body appreciation, yielded the need for a revised version of the instrument (BAS-2; Tylka & Wood-Barcalow, 2015b).

In this new version – the Body Appreciation Scale-2 – psychometrically poor-performing items from the BAS were deleted and new items reflecting developments in the conceptualization of positive body image were developed (Tylka & Wood-Barcalow, 2015b). In the parent study, exploratory factor analysis (EFA) as well as confirmatory factor analysis (CFA) with college and community samples from the United States demonstrated that scores on the 10-item BAS-2 reduce to a single dimension. In addition, BAS-2 scores were found to have good test-retest reliability over a 3-week period, adequate internal consistency coefficients, and good convergent, incremental, and discriminant validity (Tylka & Wood-Barcalow, 2015b). Later work showed that scores on the measure are also factorially valid and unitary in sexual minority groups from the United States (Soulliard & Vander Wal, 2019) and invulnerable to priming in Canadian university women (Dignard & Jarry, 2019). These properties have meant that BAS-2 has quickly become the most widely-used measure of positive body image, with adaptations for children also having been produced (Halliwell et al., 2017).

The factor structure of the BAS-2 also benefits from examination in a wide range of linguistic and national groups using both EFA and CFA. In terms of the former, studies have shown that BAS-2 scores reduce to a single dimension in college samples from Hong Kong (Swami & Ng, 2015), Iran (Atari, 2016), the Netherlands (Alleva et al., 2016), Cyprus (Argyrides, 2019), and the United Arab Emirates (Vally et al., 2019), as well as a community sample from Serbia (Jovic et al., 2017). In terms of the latter, the results of CFA-based studies have shown adequate fit of the 1-dimensional factor structure in a mixed staff-and-student sample from China (Swami et al., 2016), and Brazil (Junqueira et al., 2019), college samples from France (Kertechian & Swami, 2017), Iran (Hosseini et al., 2018), Japan (Namatame et al., 2017), and Romania (Swami, Tudorel et al., 2017), older adults from Portugal (Meneses et al., 2019), community samples from Malaysia (Swami et al., 2019), Poland (Razmus & Razmus, 2017), and Spain (Swami, García, et al., 2017), and teachers from Turkey (Anlı et al., 2017). The results of CFA have also supported the factorial validity of BAS-2 scores in children from Japan (Namatame et al., 2020) and adolescents from Lithuania (Baceviciene & Jankauskiene, 2020), Denmark, Portugal, and Sweden (Lemoine et al., 2018) and Mexico, Argentina, and Colombia (Góngora et al., 2020).

Despite evidence of strong factorial validity, evidence of multi-group invariance across sex – which, it should be noted, has not been investigated across all the aforementioned studies – is less clear-cut cross-nationally. While some studies, following the parent study (Tylka & Wood-Barcalow, 2015b), have shown that BAS-2 scores achieve full measurement invariance between women/girls and men/boys (Góngora et al., 2020; Kertechian & Swami, 2017; Junqueira et al., 2019; Lemoine et al., 2018; Meneses et al., 2019; Namatame et al., 2017, 2020; Razmus & Razmus, 2017; Swami et al., 2016; Swami, García et al., 2017), only partial sex invariance was obtained in a sample from Malaysia (Swami et al., 2019) and only metric invariance across sex was obtained in a sample from Romania (Swami, Tudorel et al., 2017) and adolescents from Lithuania (Baceviciene & Jankauskiene, 2020). Similarly, evidence of sex differences on BAS-2 scores is mixed, with some studies reporting that men/boys have significantly higher scores than women/girls and others reporting no significant differences. Indeed, a recent meta-analysis of gender differences in body appreciation reported only a small effect (*d* = 0.27), with boys/men have significantly higher body appreciation than girls/women (He et al., 2020).

Beyond issues of factorial validity, there is also a wealth of evidence to support the convergent validity of BAS-2 scores across nations. Thus, BAS-2 scores have been found to be positively associated with scores on a range of measures of psychological well-being, primarily self-esteem (e.g., Argyrides, 2019; Atari, 2016; Baceviciene & Jankauskiene, 2020; Namatame et al., 2017, 2020; Swami, García et al., 2017; Swami et al., 2016; Swami, Tudorel et al., 2017), life satisfaction (Alcaraz-Ibáñez et al., 2017; Atari, 2016; Junqueira et al., 2019; Namatame et al., 2017; Swami, García, et al., 2017; Swami et al., 2019), and subjective happiness (Swami et al., 2019; Swami, Tudorel et al., 2017). BAS-2 scores are also consistently related to scores on other indices of body image or body image-related constructs, including positive associations with appearance and body satisfaction (e.g., Alleva et al., 2016), body areas satisfaction (e.g., Argyrides, 2019; Swami, García, et al., 2017), and body pride (e.g., Razmus & Razmus, 2017; Vally et al., 2018), and negative correlations with internalisation of the thin ideal (Jovic et al., 2017), body dissatisfaction (Namatame et al., 2020), symptoms of disordered eating (Baceviciene & Jankauskiene, 2020; Marta-Simões & Ferreira, 2020; Namatame et al., 2017; Swami, Tudorel, et al., 2017), and weight discrepancy in women (Jovic et al., 2017; Swami & Ng, 2015; Swami et al., 2016). It should be noted, however, that associations between BAS-2 scores and body mass index (BMI) are less certain: while most studies have reported significant and negative correlations (e.g., Alleva et al., 2016; Razmus & Razmus, 2017; Swami, Tudorel, et al., 2017), some studies have reported no significant correlations in men (Jovic et al., 2017; Swami & Ng, 2015; Swami, Ng, et al., 2016; Swami et al., 2019) and women (Vally et al., 2018), or significant positive correlations in men (Atari, 2016).

* 1. **The Israeli Context**

While it is clear that the BAS-2 has been quickly adopted by body image scholars cross-culturally, it is also apparent that the psychometrics of the instrument has received more sustained attention in some geographic regions (e.g., Europe, East and Southeast Asia) compared to others. In particular, relatively limited focus has been paid to the psychometrics of the BAS-2 in the Middle East, which our study helps to rectify through its reliance on an Israeli sample of adults. Located at the crossroads of Europe, Asia, and Africa, Israel is a culturally and religiously heterogeneous Westernized nation, that is also considered traditional in terms of lifestyle (Geller et al., 2020; Latzer et al., 2008). This has implications for the study of body image, where it has been suggested that Israeli culturo-religious norms – including greater traditional family-orientation, lower appearance orientation, and a strong sense of national identity – promotes healthier attitudes toward the body (e.g., Barak et al., 1994; Safir et al., 2005). Nevertheless, there is also some evidence that any protective features of Israeli society on body image have been eroded more recently as the nation becomes increasingly Westernized (see Greenberg et al., 2007; Heiman & Olenik-Shemesh, 2019; Shloim et al., 2019).

In terms of body appreciation specifically, several studies have utilised the BAS, although its psychometric properties have not been examined and a 1-dimensional factor structure assumed *a priori* (e.g., Bodner & Bergman, 2019; Geller et al., 2018; Handelzalts et al., 2017). This is important both because studies have shown that BAS scores may not be 1-dimensional in some national settings and because, in rushing to use the BAS in applied healthcare and educational settings (e.g., Golan & Abu Ahmad, 2018; Mouallem & Golan, 2018), scholars may be producing artefactual results. Thus, an important first step for research on positive body image in Israel will be to ascertain the psychometric properties of an appropriate instrument, which the present study sought to achieve in terms of the BAS-2. In this regard, it should be noted that the Body Investment Scale (BIS; Orbach & Mikulincer, 1998) – an emic instrument originally developed to measure suicide-related body image investment – includes several items (e.g., “I am satisfied with my appearance”) and subscale constructs (e.g., body protection) that map onto contemporary definitions of positive body image. Thus, although the BIS was not specifically developed as a measure of positive body, it would be useful to examine associations between scores on the BIS and BAS-2.

* 1. **The Present Study**

 In the present study, therefore, our objective was to produce a novel Hebrew translation of the BAS-2 and to conduct a preliminary assessment of its psychometric properties in a sample of Israeli adults. To achieve the latter objective, we followed recently recommended guidelines for the test adaptation of body image instruments (Swami & Barron, 2019). Specifically, we used an EFA-to-CFA strategy, which allowed us to first explore the best-fitting model of BAS-2 scores for our sample (i.e., using EFA to conduct a sample-derived exploration of factor structure) before examining the best-fitting structure with regards to hypothesised modelling (i.e., using CFA to examine fit of the 1-dimensional model derived from the parent study and the model or models derived from the EFA, if discrepant). Based on the literature reviewed above, we expected that Hebrew BAS-2 scores would reduce to single dimension with all 10 items in both EFA and CFA. Further, we examined the extent to which the derived factor structure would be invariant at the configural, metric, and scalar levels between women and men. Here, we predicted that Hebrew BAS-2 scores would achieve full measurement invariance across sex and that men would have significantly higher body appreciation compared to women.

 In addition, we also examined the reliability of BAS-2 scores, with the expectation that scores on the unitary model of the BAS-2 would have adequate internal consistency. Finally, we assessed convergent validity by computing the relationships between BAS-2 scores and scores on previously-validated Hebrew instruments of psychological well-being (i.e., self -esteem and life satisfaction) and body image investment (operationalized using the BIS). As a further index of convergent validity, and based on previously-reported significant associations (e.g., Raque-Bogdan et al., 2016; Siegel et al., 2020), we also examined the association between body appreciation and self-compassion. Evidence of construct validity would be demonstrated through significant positive correlations between BAS-2 scores and scores on all additional measures. We also assessed relationships between BAS-2 scores and BMI, but given the equivocal results of previous work (see above), this aspect was more exploratory. Nevertheless, as a preliminary hypothesis, we expected that significant and negative correlations would emerge in both women and men.

**2. Method**

**2.1. Participants**

 The total dataset consisted of 670 individuals, but 57 participants were missing substantial portions of data (> 60%) and were deleted listwise following best-practice recommendations (Parent, 2013). The final dataset, therefore, consisted of 362 women and 251 men. All participants were Israeli citizens who ranged in age from 18 to 80 years (*M* = 29.52*, SD* = 9.47) and in self-reported BMI from 15.24 to 44.08 kg/m2 (*M* = 23.25, *SD* = 3.79). The majority of participants self-reported their religious background as Jewish (92.3%; Muslim = 2.8%, Christian = 0.7%; other = 4.3%). In terms of educational qualifications, 31.4% had completed high school, 45.0% had an undergraduate degree, 18.5% had a postgraduate degree, and the remainder had some other qualification.

**2.2. Measures**

 **2.2.1. Body appreciation.** Participants were asked to complete a Hebrew translation of the BAS-2 (Tylka & Wood-Barcalow, 2015b). The BAS-2 consists of 10 items with a 5-point response scale anchored at 1 (*never*; Hebrew: לעולם לא) and 5 (*always*; Hebrew: תמיד). The procedure followed for translating the BAS-2 into Hebrew is described in Section 2.3 and items in English and Hebrew are presented in Table 1.

 **2.2.2. Life satisfaction.** Participants were asked to complete the Satisfaction with Life Scale (SLS; Diener et al., 1985; Hebrew translation: Anaby et al., 2010), a 5-item scale that taps individuals’ assessments of the quality of their lives (sample item: “I am satisfied with my life”). The SLS items were rated on a 5-point scale (1 = *strongly disagree*, 5 = *strongly agree*) and an overall score was computed as the mean of all items, so that higher SLS scores reflect greater life satisfaction. Scores on the Hebrew SLS have been shown to have a 1-dimensional factor structure, adequate internal consistency, and good construct validity (Anaby et al., 2010). In the present work, ω for scores on this scale was .86 (95% CI = .84, .88).

 **2.2.3. Self-esteem**. To measure self-esteem, we used the 10-item Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965; Hebrew translation: Schmitt & Allik, 2005), a widely-used instrument that indexes an individual’s global self-esteem (sample item: “I feel I have a number of good qualities). Items were rated on a 4-point scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*). An overall score was computed as the mean of all 10 items following reverse-coding of 5 negatively-worded items. Higher RSES scores reflect greater self-esteem. Scores on the Hebrew version of the RSES have been shown to have a one-dimensional factor structure and adequate internal consistency (Schmitt & Allik, 2005). Here, ω for scores on this scale was .88 (95% CI = .87, .89).

 **2.2.4. Self-compassion**. Participants were asked to complete the 26-item Self-Compassion Scale (SCS; Neff, 2003; Hebrew translation: Gerber et al., 2015). This instrument assesses six aspects of self-compassion, namely self-kindness (sample item: “I try to be understanding and patient toward aspects of my personality I don't like”), self-judgment (sample item: “I'm disapproving and judgmental about my own flaws and inadequacies”), common humanity (sample item: “I try to see my failings as part of the human condition”), isolation (sample item: “When I think about my inadequacies it tends to make me feel more separate and cut off from the rest of the world”), mindfulness (sample item: “When something painful happens I try to take a balanced view of the situation”), and over-identification (sample item: “When I'm feeling down I tend to obsess and fixate on everything that's wrong”). Responses were made on a 5-point scale ranging from 1 (*almost never*) to 5 (*almost always*), with responses to negative-valenced items reverse-coded. An overall SCS score was computed as the mean of all items, so that higher scores indicate greater self-compassion. Previous research has shown that total SCS scores on the Hebrew version have adequate factorial validity and internal consistency (Gerber et al., 2015). In the current sample, ω for scores on this scale was .92 (95% CI = .91, .93).

 **2.2.5. Body investment.** The survey package included the Body Investment Scale (BIS; Orbach & Mikulincer, 1998), a 24-item instrument assessing emotional investment in the body. The scale is comprised of four 6-item subscales, namely feelings and attitudes toward the body (sample item: “I am satisfied with my appearance”), comfort with physical touch (sample item: “I enjoy physical contact with other people”), body care (sample item: “I like to pamper by body”), and body protection (sample item: “I’m not afraid to engage in dangerous activities”). All items were rated on a 5-point scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Following reverse-coding of 9 items, subscale scores were computed as the mean of relevant items, so that higher scores indicate more positive feelings about the body and about touch, and greater body care and protection. Scores on the Hebrew version of the BIS have been shown to have a 4-factor structure and adequate indices of construct validity (Orbach & Mikulincer, 1998). In the current sample, ω was .92 (95% CI = .91, .93) for the Feeling subscale, .72 (95% CI = .68, .76) for the Touch subscale, .74 (95% CI = .71, .78) for the Care subscale, and .70 (95% CI = .66, .74) for the Protection subscale.

 **2.2.6. Demographics**. Participants were asked to complete their demographic details consisting of sex, age, religion, and educational qualifications. Participants were also asked to self-report their height and weight, which we used to compute BMI as kg/m2.

**2.3. Test Adaptation**

The BAS-2 was translated from English to Hebrew using the parallel back-translation procedure (Brislin, 1970) supplemented with committee review. In the first step, a bilingual individual translated the scale from English to Hebrew, while a second individual translated this version back into English. In the second step, the two translations were reviewed by the first and second authors. As the authors concluded that the dissimilarities between the two versions were large enough to rule out the use of the first translation, a second round of translations was initiated. In the third step, two new independent translators who were naïve to the BAS-2 repeated the procedure. In a fourth step, the forward- and back-translations were examined by a committee consisting of the first, second, and third authors, alongside the translators. Following a consensual discussion, minor modifications were made to Item #8 to improve grammatical clarity, while maintaining semantic and item equivalence. The items of the final translation are reported in Table 1.

**2.4. Procedures**

All research was conducted in accordance with the principles of the Declaration of Helsinki and ethics approval was obtained from the Institutional Review Board at The Academic College of Tel Aviv-Yaffo (approval code: 2018158). The data for the present study were collected from August 2018 to May 2019 by the fourth author, who recruited participants voluntarily through social media networks, through a university website for course credit, or directly from areas of congregate activities (e.g., parks, train stations) in Israel. Potential participants were approached and, if they met inclusion criteria (Israeli citizens, aged 18 years or older, and fluent in Hebrew), they were provided with brief information about the project and the estimated completion duration of the questionnaire. Written consent from all participants was obtained prior to both the anonymous paper-and-pencil or the anonymous online completion of the questionnaires. The order of presentation of the scales described above was counterbalanced for each participant, and demographic items were always presented first. Data were treated confidentially and participants were fully debriefed following completion of the questionnaires.

**2.5. Analytic Strategy**

 **2.5.1. Data treatment.** Missing data represented 4.12% of the total dataset. These data were missing completely at random as determined by Little’s (1988) Missing Completely at Random (MCAR) test, χ2(910) = 226.79, *p* = .209, and were replaced using the multiple imputation expectation maximisation technique, generating 50 imputations (Graham et al., 2007), using the *MICE* package (van Buuren, 2018) in *R* (*R* development Core Team, 2014). In order to assess the factorial validity of Hebrew BAS-2 scores, we used the two-step EFA-to-CFA strategy recommended by Swami and Barron (2019) for test adaptation of body image instruments. In order to ensure adequate sample sizes for both steps, the total sample was split using a computer-generated semi-random seed, resulting in one split-half for EFA (*n* = 377) and a second split-half for CFA (*n* = 235). There were no significant differences between the two split-half subsamples in terms of mean age and BMI, nor in the distributions of religious affiliation and educational qualifications (all *p*s > .518; details available from the corresponding author).

 **2.5.2. Exploratory factor analysis.** Data from the first split-half subsample were subjected to EFA using the *psych* package (Revelle, 2019) in *R* (*R* Development Core Team, 2014) separately for women (*n* = 227) and men (*n* = 150). These subsample sizes satisfied Worthington and Whittaker’s (2006) item-communality requirements, as well as assumptions for EFA based on item distributions, average item correlations, and item-total correlations (Clark & Watson, 1995). Data factorability was assessed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (which should ideally be ≥ .80) and Bartlett’s test of sphericity (which should be significant). Principal-axis factoring was used for the EFAs as it yields results similar to commonly-used maximum likelihood estimation without assuming multivariate normality (Fabrigar et al., 1999; Goretzko et al., 2020). Given the expectation of a single orthogonal factor, a quartimax rotation was applied (Pedhazur & Schmelkin, 1991). To estimate the number of factors to extract and factor structure adequacy, we examined fit statistics (Finch, 2020) (see Section 2.5.4 below), supplemented by parallel analysis (Horn, 1965). Item retention was based on Comrey and Lee’s (1992) recommendation that items with “fair” loadings and above (i.e., ≥ .33) should be retained. Finally, the degree of factor similarity across women and men was assessed using Tucker’s (1951) congruence coefficient, with values between .85 and .94 corresponding to fair similarity across groups and values ≥ .95 suggesting that factor structures can be considered equal across groups (Lorenzo-Seva & ten Berge, 2006).

 **2.5.3. Confirmatory factor analysis.** Data from the second split-half were subjected to CFA using the *lavaan* (Rosseel, 2012), *semTools* (Jorgensen et al., 2018), and *MVN* packages (Korkmaz et al., 2014) with *R* (*R* Development Core Team, 2014). Swami and colleagues (2019) previously reported that, based on proactive Monte Carlo simulations, a sample size of 220 would be sufficient for CFA. Given that factor loadings reported by Swami and colleagues (2019) were broadly consistent with those we report here, we considered our sample sizes in the second split-half subsample (*n* = 235; women *n* = 135, men *n* = 101) to be adequate. Here, we aimed to test the 1-factor model proposed by Tylka and Wood-Barcalow (2015b) and, if discrepant, any models that emerged from the EFAs. Assessment of the data for normality indicated that they were neither univariate (Shapiro-Wilks *p* < .001) nor multivariate normal (Mardia’s skewness = 476.93, *p* < .001, Mardia’s kurtosis = 13.35, *p* < .001), so parameter estimates were obtained using the robust maximum likelihood method (see Ullmann, 2006) with the Satorra-Bentler correction (Satorra & Bentler, 2001).

**2.5.4. Fit statistics.** For both EFA and CFA, goodness-of-fit was assessed using commonly-used fit indices, namely the normed model chi-square (χ²/df; values < 3.0 considered indicative of good fit; Hu & Bentler, 1999), the Steiger-Lind root mean square error of approximation (RMSEA) and its 90% CI (values close to .06 considered to be indicative of good fit and up to .08 indicative of adequate fit; Steiger, 2007), the standardised root mean square residual (SRMR; values < .09 indicative of good fit; Hu & Bentler, 1999), and the Tucker-Lewis index (TLI; values close to or > .95 indicative of good fit; Hu & Bentler, 1999), and the comparative fit index (CFI; values close to or > .95 indicative of adequate fit; Hu & Bentler, 1999). The Satorra-Bentler (Satorra & Bentler, 2001) was applied to fit indices for CFA; corrections to fit indices were not required for the EFAs as EFA is robust to violations of univariate and multivariate normality (Curran et al., 1996).

 **2.5.5. Multi-group invariance.** To examine sex invariance of BAS-2 scores, we conducted multi-group CFA (Chen, 2007) using data from the second split-half sample. Measurement invariance was assessed at the configural, metric, and scalar levels. Configural invariance implies that the latent BAS-2 variable and the pattern of loadings of the latent variable on indicators are similar across sex (i.e., the unconstrained latent model should fit the data well in both groups). Metric invariance implies that the magnitude of the loadings is similar across sex. This is tested by comparing two nested models consisting of a baseline model and an invariance model. Because the Δ*χ*² statistic is overly stringent criterion invariance (Meade et al., 2008), we used ΔCFI < .01 as an indicator of metric invariance (Cheung & Rensvold, 2002). Lastly, scalar invariance implies that both the item loadings and item intercepts are similar across sex and is examined using the same nested-model comparison strategy as with metric invariance (Chen, 2007). For scalar invariance, Chen (2007) suggested that invariance is supported when ΔCFI < .01 *and* ΔRMSEA < .015 *or* ΔSRMR < .030, although other scholars suggest that ΔCFI < .01 is sufficient (Cheung & Rensvold, 2002).

 **2.5.6. Further analyses.** The internal consistency of BAS-2 scores in both split-half subsamples was assessed using McDonald’s ω and its associated 95% CI, with values greater than .70 reflecting adequate internal reliability (Dunn et al., 2014). In the CFA portion of the dataset, evidence of convergent validity was assessed using the Fornell-Larcker criterion (Fornell & Larcker, 1981), with average variance extracted (AVE) values of ≥ .50 considered adequate (Malhotra & Dash, 2011) and meaning that a latent variable is able to explain more than half of the variance of its indicators on average. Our analytic strategy allowed for an examination of sex differences on BAS-2 scores using an independent-samples *t*-test only if scalar invariance were established. To assess convergent validity, we used the total sample and examined bivariate correlations between BAS-2 scores and scores on the additional measures included in the survey, namely life satisfaction, self-esteem, self-compassion, the body investment subscale scores, and BMI. Based on Cohen (1988), values > .10 were considered weak, > .30 were considered moderate, and > .50 were considered strong correlations.

**3. Results**

**3.1. Exploratory Factor Analysis**

 **3.1.1. Female subsample.** For the female subsample from the first split-half of participants (*n* = 227), Bartlett’s test of sphericity, χ2(45) = 1790.18, *p* < .001, and the KMO measure of sampling adequacy, KMO = .94, indicated that the BAS-2 items had adequate common variance for factor analysis. Only one factor had λ > 1, explaining 62.0% of common variance, and parallel analysis indicated that only this factor should be extracted (criterion λ *vs*. random data λ = 6.55 > 1.34). The fit indices for the 1-factor model were adequate, χ2(35) = 106.41, *p* < .001, χ²normed = 3.04, TLI = .918, CFI = .960, RMSEA = .109 (90% CI = .081, .133), SRMR = .04. As reported in Table 1, all 10 items had minimally “fair” factor loadings based on Comrey and Lee’s (1992) standards. Internal consistency for the 10-item total score in this subsample was adequate, with ω = .94 (95% CI = .93, .95).

 **3.1.2. Male subsample.** For the male subsample from the first split-half (*n* = 150), Bartlett’s test of sphericity, χ2(45) = 961.43, *p* < .001, and the KMO measure of sampling adequacy, KMO = .93, indicated that the IES-2 items had adequate common variance for factor analysis. Only one factor had λ >1, explaining 57.0% of common variance. Parallel analysis indicated that only a single factor should be extracted (criterion λ *vs*. random data λ = 6.14 > 1.45). Fit indices for the 1-factor model were adequate: χ2(35) = 94.20, *p* < .001, χ²normed = 2.69, TLI = .918, CFI = .937, RMSEA = .109 (90% CI = .081, .133), SRMR = .05. All 10 BAS-2 items had minimally “fair” factor loadings (see Table 1) and internal consistency of the total score was adequate, with ω = .93 (95% CI = .90, .95).

**3.1.3. Factor structure congruence.** Tucker’s congruence coefficient for the EFA-derived models with women and men was .99, suggestive of factor-structure similarity. In summary, the EFAs with both women and men suggested that a single factor consisting of all 10 BAS-2 items should be extracted. As such, we next tested the fit of this 1-factor model using CFA in the second split-half sample.

**3.3. Confirmatory Factor Analysis**

 Using data from the second split-half sample (*n* = 235), CFA indicated that fit of the 1-factor model was adequate on some indices but less-than-adequate on others: SBχ²(35) = 66.40, SBχ²normed = 1.90, robust RMSEA = .092 (90% CI = .058-.126), SRMR = .053, robust CFI = .953, robust TLI = .939. Suggested modification indices were considered to improve model fit. Specifically, modification indices were consulted to free error covariances between Items #1 and 5 (MI = 14.85), which resulted in significantly improved model fit, χ²(1) = 15.31, *p* <.001. With this modification, all fit indices were within acceptable parameters: SBχ²(34) = 57.50, SBχ²normed = 1.69, robust RMSEA = .080 (90% CI = .042-.115), SRMR = .05, robust CFI = .966, robust TLI = .955. In this subsample, ω was .94 (95% CI = .93, .95). The standardised estimates of factor loadings were all adequate (see Figure 1). The convergent validity for this model was adequate, as AVE = .57.

**3.4. Sex Invariance and Between-Group Differences**

Using the second split-half sample, we tested for sex invariance based on the 1-factor model of BAS-2 scores. As reported in Table 2, all indices suggested that configural, metric, and scalar invariance was supported across sex. Given these results, we computed an independent-samples *t*-test with BAS-2 scores from the total sample as the dependent variable and sex as the independent variable. An independent-samples *t*-test indicated that men (*M* = 3.72, *SD* = 0.76) had significantly higher body appreciation than women (*M* = 3.54, *SD* = 0.81), *t*(610) = 2.74, *p* = .006, *d* = 0.22.

**3.5. Further Analyses**

We examined the construct validity of BAS-2 scores using the total sample but separately for women and men (see Table 3). In both women and men, body appreciation was significantly, positively, and moderately correlated with self-esteem, life satisfaction, self-compassion, and body care. In addition, body appreciation was strongly and positively associated with feelings and attitudes toward the body, and weakly associated with body protection and comfort with physical touch. In women, body appreciation was also significantly, negatively, and weakly associated with BMI. The same association was not significant in men. Because the relationship between body appreciation and BMI may be non-linear in men, we also examined the association between BAS-2 scores and BMI2, but this association was also non-significant, *r* = -.08, *p* = .187.

**Discussion**

The aim of the present study was to test the factor structure and psychometric properties of the Hebrew translation of the BAS-2 in a sample of Israeli, Hebrew-speaking adults. In terms of factorial validity, we found using both EFA and CFA that scores in the Hebrew BAS-2 had a 1-dimensional structure factor retaining all 10-items. These findings are in line with the parent BAS-2 study (Tylka & Wood-Barcalow, 2015b), as well as all previous test adaptation studies that have used the BAS-2. Based on the present and extant results, it may be suggested that scores on the BAS-2 are unitary when presented in diverse linguistic and national groups. However, it should be noted that it was necessary to incorporate a correlated error term between Items #1 and 5 in the present study to achieve adequate fit in our CFA, similar to previous test adaptation studies (e.g., Swami, Tudorel et al., 2017). It is possible that this is reflective of shared method variance that is relatively unimportant in terms of considering BAS-2 scores as unidimensional, although it may also be reflective of item redundancy or shared item meaning. This could be investigated further using Item Reponse Theory, which could provide a fuller determination of the extent to which BAS-2 items are truly unidimensional (Hartig & Höhler, 2009).

 Our findings also showed that the Hebrew BAS-2 scores were invariant across sex; that is, we were able to establish sex invariance at the configural, metric, and scalar levels. This is consistent with findings from a number of earlier test adaptation studies (e.g., Kertechian & Swami, 2017; Lemoine et al., 2018; Meneses et al., 2019; Swami et al., 2016), as well as the parent study (Tylka & Wood-Barcalow, 2015b). Furthermore, in accordance with our hypothesis, men were found to have significantly higher body appreciation compared to women. Nevertheless, it should be noted that the effect size of the difference was small, although this too is consistent with earlier work that has demonstrated a sex difference in body appreciation scores (see He et al., 2020). We might conclude that the sex difference in body appreciation is fairly robust across national contexts, although the real-world significance of this difference is perhaps small. As He and colleagues (2020) have suggested, however, it may be useful to pay particular attention to ways of improving body appreciation is Israeli women, so as to reduce the gender disparity and promote more positive body image for all adults.

 The results of the present study also indicated that body appreciation scores had adequate internal consistency coefficients in both women and in men. In terms of convergent validity, BAS-2 scores were significantly associated in the expected directions with scores on several other measures. Specifically, in both women and men, body appreciation was significantly, positively, and moderately correlated with indices of psychological well-being (i.e., self-esteem and life satisfaction) and self-compassion. However, the results in terms of BMI were more mixed: while body appreciation was significantly and negatively associated with BMI in women, relationships in men did not reach significance. It should be noted that the relationships between body appreciation and BMI in previous studies have been equivocal. The extent to which BMI provides an adequate assessment of convergent validity for body appreciation may, therefore, be questioned, particularly in men.

 In the present study, we also examined associations between BAS-2 scores and body image investment, as operationalized using the BIS. We found that body appreciation was significantly and weakly-to-moderately associated with indices of body protection, body care, and comfort with physical touch, respectively, which provides some evidence of convergent validity. Interestingly, however, BAS-2 scores were strongly and positively associated with feelings and attitudes toward the body in women (*r* = .87) and men (*r* = .83). Although this facet of the BIS was originally intended to measure the degree of emotional investment in the body that may lead to bodily self-harm (Orbach & Mikulincer, 1998), it might be suggested that it in fact taps constructs that overlap with body appreciation. Indeed, there appears to be some semantic similarity between items of the BAS-2 and items on this subscale of the BIS. One way of ascertaining the precise degree of item and construct overlap would be through the use of Item Pool Visualisation (Dantlgraber et al., 2019), a methodology that has been recently applied to measures of positive body image (Swami et al., 2020). Item Pool Visualisation would allow for a more precise mapping of both item and construct overlap between the BAS-2 and BIS. Having said that, it should be noted that the BIS was not specifically designed as a measure of positive body image and, as such, we would recommend use of the BAS-2 for scholars seeking to measure the construct in the Israeli context.

The strengths of the current study include the robust translational procedures that we employed to develop the Hebrew version of the BAS-2. However, our study is not without limitations. The first concerns the opportunistic recruitment strategy employed in the study, which prevents us from being able to generalize our results to wider Israeli society. It would be useful for future studies using this BAS-2 version to employ nationally representative samples, as this would allow for a more accurate mapping of body appreciation in this national context. In a similar vein, our sample was almost entirely comprised of participants who self-identified as Jewish. The small sample sizes of other ethno-religious denominations meant it was not possible to assess multi-group invariance on this dimension. This might be important to rectify in future research, particularly given evidence of possible inter-ethnic (see Safir et al., 2005) and inter-religion differences (Bachner-Melman & Zohar, 2019; Handelzalts et al., 2017) in body image in Israelis. In future work, it would also be valuable to examine the association between BAS-2 scores and additional constructs to extend the evidence base of construct validity. This might include variables such as the degree to acculturation to Westernisation, although doing so will depend on the availability of translated and validated instruments. Finally, future work could extend the psychometric evidence base for the BAS-2 by examining test-retest reliability, as well as predictive and incremental validity.

In conclusion, the results of the present study provide evidence that support the psychometric properties of a Hebrew translation of the BAS-2 in Israeli adults. Specifically, the results of our EFA-to-CFA procedure indicated that Hebrew BAS-2 scores were best considered as 1-dimensional, with adequate internal consistency coefficients, invariance across sex, and adequate indices of internal validity. The availability of the Hebrew BAS-2 adds to the corpus of evidence supporting the validity and reliability of the BAS-2 in multiple and disparate national contexts and social identity groups. For scholars working with Israeli populations more specifically, the availability of the BAS-2 should facilitate further and deeper understandings of positive body image context in a hitherto relatively neglected population. This is particularly important as Israel becomes increasingly Westernized and deals with the attendant impacts that such developments have on body image. In particular, the Hebrew BAS-2 would offer scholars improved assessments of positive body image compared to methods that are currently used (e.g., single-item instruments of uncertain validity; Korn et al., 2013), which in turn would mean greater confidence in the reliability and validity of findings and implications for practice.

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Table 1

*Body Appreciation Scale-2 Items in English and Hebrew, and Associated Item-Factor Loadings for Participants from the First Split-Half Subsample.*

|  |  |  |
| --- | --- | --- |
| BAS-2 items | Women | Men |
| 1. I respect my body / *אני מכבד/ת את גופי* | .70 | .67 |
| 2. I feel good about my body / *אני מרגיש/ה טוב ביחס לגופי* | .89 | .85 |
| 3. I feel that my body has at least some good qualities / *אני מרגיש/ה שלגופי יש לפחות כמה איכויות טובות* | .76 | .71 |
| 4. I take a positive attitude towards my body / *יש לי עמדה חיובית כלפי גופי* | .91 | .87 |
| 5. I am attentive to my body’s needs / *אני קשוב/ה לצורכי גופי* | .55 | .66 |
| 6. I feel love for my body / *אני מרגיש/ה אהבה לגופי* | .88 | .78 |
| 7. I appreciate the different and unique characteristics of my body / *אני מעריכ/ה את האיכויות השונות והייחודיות של גופי* | .83 | .74 |
| 8. My behaviour reveals my positive attitude toward my body; for example, I hold my head high and smile / *התנהגותי משקפת את עמדתי החיובית כלפי גופי. למשל, אני הולכ/ת זקופה ומחייכ/ת* | .61 | .72 |
| 9. I am comfortable in my body / *נוח לי בגופי* | .87 | .80 |
| 10. I feel like I am beautiful even if I am different from media images of attractive people (e.g., models, actresses/actors) / *אני מרגיש/ה שאני יפה, גם אם אני שונה מדימויים של אנשים מושכים בתקשורת (למשל דוגמנים/ות או שחקנים/ות)* | .78 | .73 |

Table 2

*Measurement Invariance Across Sex in the Second Split-Half Subsample.*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | SBχ² | *df* | Robust CFI | Robust RMSEA | SRMR | Model Comparison | ΔSB*χ*² | ΔRobust CFI | ΔRobust RMSEA | ΔSRMR | Δ*df* | *p* |
| Configural | 111.93 | 68 | .966 | .087 | .038 |  |  |  |  |  |  |  |
| Metric | 121.17 | 77 | .967 | .080 | .054 | Configural vs metric | 9.24 | .001 | .007 | .016 | 9 | .615 |
| Scalar | 130.06 | 86 | .968 | .075 | .056 | Metric vs scalar | 8.89 | .001 | .005 | .002 | 9 | .635 |

*Note.* SB = Satorra-Bentler; CFI = Comparative fit index; RMSEA = Steiger-Lind root mean square error of approximation; SRMR = standardised root mean square residual.

Table 3

*Associations between Body Appreciation and Additional Measures Included in the Study and for the Total Sample, Reported for Women (Upper Diagonal) and Men (Bottom Diagonal) Separately.*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| (1) Body appreciation |  | .65\*\* | .49\*\* | .54\*\* | .87\*\* | .17\* | .44\*\* | .27\*\* | -.23\*\* |
| (2) Self-esteem | .62\*\* |  | .65\*\* | .66\*\* | .70\*\* | .23\*\* | .27\*\* | .30\*\* | -.01 |
| (3) Life satisfaction | .54\*\* | .63\*\* |  | .52\*\* | .53\*\* | .27\*\* | .24\*\* | .17\* | .02 |
| (4) Self-compassion | .63\*\* | .62\*\* | .55\*\* |  | .57\*\* | .14\* | .22\*\* | .31\*\* | -.04 |
| (5) BIS – Feeling | .83\*\* | .66\*\* | .57\*\* | .63\*\* |  | .19\*\* | .38\*\* | .29\*\* | -.22\*\* |
| (6) BIS – Touch | .23\*\* | .17\* | .14\* | .20\* | .24\*\* |  | .16\* | .01 | .01 |
| (7) BIS – Care | .35\*\* | .31\*\* | .15\* | .17\* | .26\*\* | .03 |  | .31\*\* | -.04 |
| (8) BIS – Protection | .26\*\* | .24\*\* | .22\*\* | .14\* | .22\*\* | .06 | .31\*\* |  | -.11\* |
| (9) Body mass index | -.07 | .07 | -.01 | -.01 | -.10 | .11 | .01 | .03 |  |

*Note.* BIS = Body Investment Scale;\**p* < .05, \*\**p* < .001.

**

*Figure 1.* Path diagram and estimates for the 1-dimensional model of Body Appreciation Scale-2 scores. The large oval is the latent construct, with the rectangles representing measured variables, and the small circles with numbers representing the residual variables (variances). The path factor loadings are standardised with significance levels were determined by critical ratios (all *p* < .001).