

Cultural adaptation and validation of the Body Esteem Scale for Adults and Adolescents for use in English among adolescents in urban India

Abstract

Body image research is growing in India, however, there are no psychometrically valid measure to assess body image concerns among an Indian population. In this study, the Body Esteem Scale for Adults and Adolescents (BESAA) underwent adaptation and validation among urban Indian adolescents in English. Cultural adaptations were made in consultation with body image experts and acceptability interviews with adolescents in India. 1462 adolescents living in Northern India completed the adapted BESAA and measures to assess construct validity. For girls, a 15-item three-factor model provided the best fit to our data, using exploratory factor analysis, with ‘Appearance-Negative’, ‘Appearance-Positive’, and ‘Weight’ subscales. For boys, a 7-item two-factor model provided best fit, with ‘Appearance-Negative’ and ‘Appearance-Positive’ subscales. Models were confirmed via confirmatory factor analysis. The scales demonstrated good internal consistency and satisfactory test-retest reliability. Construct, convergent validity was supported for girls and boys through significant correlations with figure rating scales and disordered eating. Further analyses using common items across the female and male scales, produced a psychometrically sound scale that can be used comparatively across genders. This study presents a culturally adapted, shortened BESAA as a valid and reliable measure to assess body image concerns in English among urban Indian adolescents.

Keywords: body image; body esteem; measures validation; psychometrics; adolescents; India

Body image concerns are increasingly recognised as a global issue for adolescents (Al Sabbah et al., 2009; Peltzer, Pengpid, & James, 2016; Swami et al., 2010). However, a lack of culturally appropriate and psychometrically validated measures to accurately and reliably assess body image outside high-income, English-speaking countries has hindered research efforts to address body image concerns beyond these regions (Swami & Barron, 2019). India is the world's largest low-middle income country by population (United Nations, 2019). Emerging research suggests body image concerns are present among urban Indian adolescents (Dhillon & Dhawan, 2011; Ganesan, Ravishankar, & Ramalingam, 2018) and adults (Balhara, Mathur, & Kataria, 2012; Gupta, Bhargava, Chavan, & Sharan, 2017; Joshi, Pawalia, Kundu, & Yadav, 2019; Sihag & Joshi, 2017; Sjostedt, Schumaker, & Nathawat, 1998). Further, several studies have indicated rates of body image concerns are comparable in urban India to many other regions worldwide, particularly when comparing regions of similar socio-economic status (Gupta et al., 2017; Swami et al., 2010).

Research examining the nature of body image concerns in India is emerging. Like many high-income countries, young people in India, particularly girls, are often dissatisfied with their weight and desire a thinner figure (Gupta et al., 2001; Singh Mannat, Parsekar, & Bhumika, 2016; Stigler, Arora, Dhavan, Shrivastav, Ready, & Perry, 2011; Swami et al., 2010). However, concerns are not confined to weight and shape. Skin colour (Peltzer, et al., 2016), height (Johnson, Balasubramanya, & Britto, 2015) and body hair (Phadke, 2017) present additional sources of concern among adolescents and adults in India. As such, it is important to consider body image concerns in India in relation to the wider cultural context which values additional appearance features, such as fair skin, being tall, and a lack of body hair.

Measuring body image in India

Despite progress in the understanding the prevalence and nature of body image concerns in India, there are no culturally-appropriate validated measures to assess body image reliably in India. This is a common problem across mental health research in India (Aggarwal & Beck, 2015). Body image studies in India have relied on measures validated in high-income countries with diverse cultural landscapes, such as the Body Shape Questionnaire (Balhara et al., 2012), Body Satisfaction Scale (Stigler et al., 2011) and the Eating Disorder Inventory (Gupta et al., 2001; Shroff & Thompson, 2004). There is no evidence to suggest these measures are reliable or valid in an Indian context, therefore the quality of research to date has been compromised. Indeed, when the psychometric properties of a scale are tested in a new cultural context, a reformulation of the original scale is often required due to original factor structures failing to replicate (Swami & Barron, 2019). Furthermore, the scales used in research in India to date have exclusively focused on weight and shape concerns, overlooking additional appearance concerns that may be important in this population. Research to validate a reliable, culturally sensitive measure to assess a broad conceptualisation of body image among Indian adolescents is therefore vital (Vaidyanathan, Kuppili, & Menon, 2019).

Body Esteem Scale for Adults and Adolescents

The Body Esteem Scale for Adults and Adolescents (BESAA; Mendelson, Mendelson & White, 2001) is a widely used measure of cognitive and affective aspects of body image with strong face validity. The BESAA comprises three subscales: Appearance (10 items; e.g. 'I like how I look in pictures'), Weight (8 items; e.g. 'I really like what I weigh'), and Attribution (5 items; e.g. 'My looks help me to get dates'). The Appearance subscale focuses on broad feelings about one's appearance overall. The Weight subscale is specifically focused on feelings about one's weight. The Attribution subscale assesses one's perceptions of how others see their body and appearance. Despite weight being conceptualised as one

aspect of appearance esteem, factorial analyses conducted in a Canadian sample demonstrated appearance and weight to be two distinct factors (Mendelson, White, and Mendelson, 1996). The BESAA was found to have good internal consistency, test-retest reliability and convergent validity among this sample. The scale has since been translated and validated in an Italian adolescent sample (Confalonieri, Gatti, Ionio, & Traficante, 2008). Researchers found the original three factor model to be of adequate fit after omitting nine items; due to items either not loading on any factor, or loading onto multiple factors. It has also been validated for use in Singapore in English, whereby the original three-factor structure was reduced to a 16-item one-factor measure (Chang, Li, Loh, & Chua, 2019). Finally, the BESAA has been translated into Swedish, but psychometric validation has not been reported (Erling & Hwang, 2004).

The Weight and Appearance subscales of the BESAA are often utilised exclusively in research (e.g. Diedrichs et al., 2015; Dunaev, Schulz, & Markey, 2018; Hayfield, Halliwell, & Clark, 2017; McLean, Wertheim, Masters, & Paxton, 2017; Valois et al., 2019). This is often due to the Attribution subscale being ‘distinct from self-evaluation of weight and appearance’ (Mendelson et al., 2001, p103). Rather than focusing on a person’s own evaluation of their appearance, the Attribution subscale is related to the perception of external attitudes towards their appearance (e.g. ‘People my own age like my looks’) or appearance comparisons (e.g. ‘I’m as good looking as most people’). Therefore, the Attribution subscale is not strictly a measure of body image, as defined by how a person thinks and feels about the way they look (Cash, 2002). In addition, the Attribution subscale has been found to be a psychometrically weaker subscale (Olenik-Shemesh & Heiman, 2017).

The Current Study

The present study aimed to culturally adapt the Appearance and Weight subscales of the BESAA for use in English with Indian adolescents in urban settings and to assess their

psychometric properties in this population. Due to linguistic diversity across India, validation is ideally required in at least English and Hindi, both recognised as official languages in India (The Official Languages Act, 1963). The Indian schooling system is predominantly taught in local language and dialects, but increasingly English is being recognised as the preferred language of instruction in urban hubs (Mohanty & Panda, 2014). As such, English was deemed an important starting point for validation of the BESAA in India. In addition, this study sought to examine the construct validity of the BESAA by investigating associations between the newly confirmed factor structure with body dissatisfaction (actual-ideal body discrepancy) and eating pathology. We hypothesized that the scale would demonstrate convergent validity with body dissatisfaction and eating pathology through moderate significant correlations.

Methods

Participants

Main study sample. A total of 1465 adolescent girls and boys (44.2% girls) from four urban private schools in Delhi and Ludhiana in Northern India were recruited as part of a larger study and programme of research which aimed to concurrently validate a number of psychosocial measures among Indian adolescents. The validation of the BESAA presented in this paper is one of the measures we sought to validate; separate manuscripts will be published assessing the validity of other measures to ensure the comprehensive statistical analyses involved in the validation of each measure is reported transparently and in accordance with best practice reporting guidelines for scale validations (Swami & Barron, 2019; Mokkink et al., 2010). Participants age ranged from 11 to 15 years ($M = 12.88$, $SD = 0.85$). Most participants were born in India (98.47%). The majority practiced Hinduism (74.98%), with a minority practicing Sikhism (17.91%), Islam (1.88%), Christianity (1.18%) or another religion

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(2.30%). Over half of the participants' mothers and fathers were educated to at least degree level, which was measured as an indication of socio-economic status.

Test-retest sample. Participants at one school (n = 237; 41% girls) were re-administered the measures at a second time point one-week later to assess test-retest reliability. Between one week and 30 days is deemed the typical and/or ideal interval between testing to assess measurement stability of this nature (Streiner, Norman, & Cairney, 2015; Polit, 2014), with the shorter end of this timeframe better suited for younger populations (Anastasi & Urbina, 1997).

Measures

Body Image. Body image was measured using the Weight and Appearance subscales of the BESAA (Mendelson et al., 2001). The original subscales consisted of 18 items in total rated on a 5-point ordinal scale (1 = never, 5 = always). Prior to the main study, minor adjustments were made to the original scale items based on the expertise of Indian psychologists who had previously published research on adolescent body image in India (XX; XX; XX). Edits were minor, and included sentence restructuring (e.g. 'I feel ashamed of how I look' was adapted to 'My looks make me feel ashamed'), rephrasing to aid comprehension (e.g. 'Weighing myself depresses me' was adapted to 'Checking my weight makes me sad'), and improving clarity of sentence meaning (e.g. 'I think I have a good body' was extended to 'I think I have a good-looking body').

The third author then conducted cognitive interviews using verbal probing techniques with 12 adolescents aged 11-14 years from an urban school in North India. Each adolescent completed the measures with a researcher present, and was asked to explain what each item meant using their own words. Adolescents were also asked how easy or difficult it was for them to understand each question. Where difficulty in comprehension arose, students discussed with the interviewer how the phrase or item could be rephrased to aid understanding. Adolescents reported no issues with understanding and comprehension of the

BESAA items and as such, the items were finalised for testing without revisions after the interviews.

Body dissatisfaction. The Child Figure Rating Scale (Tiggemann & Wilson-Barrett, 1998), was administered to enable assessment of concurrent validity. This scale consists of nine images of adolescents (different for girls and boys) ranging from very slim (1) to large (9) and participants are asked to select ‘which picture most looks like you’ and ‘which picture would you like to look like’. A body dissatisfaction score is derived by subtracting the lowest numbered image from the highest numbered image selected, with the scale range between 0-8. Higher scores reflect higher body dissatisfaction, therefore we hypothesise that the BESAA will be negatively correlated with body dissatisfaction. Figure rating scales similar to the one used in this study show good test-retest and construct validity among adolescents across many countries, including Australia (Wertheim, Paxton, & Tilgner, 2004), Brazil (Adami, et al, 2012) and China (Lo, Ho, Wong, Mak, & Lam, 2011). The images in the scale were adapted for the Indian context by a professional graphic artist. The changes included clothing the figures to make them more modest and adapting their hair to be darker and thicker.

Eating Pathology. The Eating Disorder Examination Questionnaire (EDE-Q) was adapted and concurrently validated for use among Indian adolescents (XX, 2020) was used to assess convergent validity. The scale comprises 15-items for girls and 18-items for boys and consists of two subscales: Preoccupation and Control (e.g., *Have you had a strong desire to lose weight?*) and Weight and Shape Concerns (e.g., *How dissatisfied have you been with your weight?*). Scores within subscales were averaged with higher scores indicating greater eating pathology. Internal consistency in the current study was acceptable for girls (Preoccupation and Control $\alpha = .84$, Weight and Shape Concerns $\alpha = .90$) and boys (Preoccupation and Control $\alpha = .88$, Weight and Shape Concerns $\alpha = .87$). Previous research highlights body image as a key risk factor for disordered eating (Goldschmidt, Wall, Choo,

Becker, & Neumark-Sztainer, 2016; Jacobi & Fittig, 2010), and therefore, it was hypothesised that body esteem would be negatively correlated with eating pathology.

Procedure

Schools were recruited in India via opportunity sampling, using contacts of the third and seventh author. To be eligible to participate, schools must deliver curriculum primarily in English. School principals or school counsellors were approached to participate and were provided with information regarding what the study would involve (e.g. requirements of students, approximate timings). Parental consent was sought at the discretion of each school; where parental consent was not sought, headteacher consent was obtained. Students were provided with thorough information about the study prior to participation. They were advised that their responses were anonymous and that they did not have to answer any questions that brought up discomfort. After the opportunity to ask any questions about the research, participants provided written consent with the knowledge they could opt out at any time, should they wish, without needing to provide a reason. Self-report questionnaires were administered to groups of no more than 50 students at a time under standardised conditions with supervision by the third author and a schoolteacher. A subsample of participants from one school completed the measures again one week later to assess test-retest reliability. Student participation was voluntary and schools received an honorarium of 13500 Indian Rupees to purchase equipment for their school. Ethics approval was obtained from the Ethics Committee at the first author's institution (HAS.18.01.074).

Statistical analyses

Analyses were conducted in R (R Core Team, 2019), MPlus 8 (Muthén & Muthén, 1998-2017), and SPSS (IBM Corp, 2017) statistical packages. Missing values per item ranged from .9-3.7% and .8-6.2% for boys and girls, respectively. Due to the low values of missing data, multiple imputation was not conducted, and listwise deletion of incomplete data

was used. Participants who had more than 10% of items missing and/or had at least 80% of the same responses across all items were removed from the dataset as non-reliable responders. This resulted in 1435 participants; 794 (55.33%) boys and 641 (44.67%) girls.

The latent structure of the measure was evaluated through item factor analysis (IFA; often referred to factor analysis for categorical data) as the 5-point ordinal data were skewed and therefore it is not advisable to use the common factor model (designed for normal data). This sample size was appropriate for the analyses and in excess of the recommended participant-to-item ratio of 10:1 (Swami & Barron, 2019; Tabachnick & Fidell, 2013). The weighted least squares estimator (WLSMV; Muthén, du Toit, & Spisic, 1997) and oblimin and promax rotations were used for male and female versions respectively, as it is assumed the factors are correlated (Mendelson, et al, 2001). The number of factors to be retained in EFA was selected by following the Guttman-Kaiser criterion (Guttman, 1954; Kaiser, 1960), and by identifying the number of the eigenvalues that were larger than the eigenvalues of 50 randomly generated samples with the same number of factors and observations (parallel analysis criterion; Horn, 1965). The latter was conducted using R package ‘random.polychor.pa’ for categorical data (Presaghi & Desimoni, 2019), and the results were depicted using Cattell’s (1966) scree plot.

The sample was split in two halves using a random number generator; a random half was used in exploratory factor analysis (EFA), and another in confirmatory factor analysis (CFA). Negatively worded items were reverse scored prior to undergoing exploratory factor analysis. As such, higher scores on each item (and thus each factor) are indicative of higher body esteem. The absolute and relative fit of different models were evaluated to ascertain the number of factors to retain. The goodness of fit indices that were computed include the relative chi-square (Relative χ^2 : values <2 suggest a close fit), the Root Mean Square Error of Approximation (RMSEA: values $<.08$ indicate an adequate fit; Hu and Bentler, 1999), the Tucker Lewis Index

(TLI: values $>.90$ suggest a close fit; Bentler and Bonett, 1980), the Comparative Fit Index (CFI: values $>.95$ are required for a close fit; Hu and Bentler, 1999; West et al., 2012), and the Standardized Root Mean Residual (SRMR: $<.05$ are required for a good fit; Hu & Bentler, 1999). To improve the fit of the scale in our sample we omitted items that were found to be problematic according to the following criteria, a) low stability over one week period (Cohen's Kappa <0.4 , according to Landis & Koch, 1977, and b) items that had cross-loadings of $>.25$ on more than one factor, and/or loadings $<.40$ on a single factor and/or no loading on any factor.

Multiple indicator multiple cause (MIMIC) model (Muthén, 1979) was used to assess measurement invariance in relation to gender. If the direct effect of gender on a particular item is significant, then measurement non-invariance due to gender is considered evident for that item.

The reliability of the scales in terms of internal consistency was evaluated using Cronbach's (1951) alpha coefficient (α values above $.7$ indicate acceptable internal consistency; however, for subscales with small number of items (c. 3-4 items) α of $.60$ is accepted), Cronbach's alpha if item deleted (AID), and item-total correlations (ITC; values between $.30$ and $.80$ were considered acceptable). Internal consistency was assessed within each factor that emerged by factor analysis. Test-retest reliability was assessed at item level through weighted kappa coefficient (κ ; Cohen, 1968), percentage of agreement, and the Psi coefficient (Kuiper & Hogenboezem, 2019). The mixed effects, absolute agreement intraclass correlation coefficient was used at subscale level (ICC; Koch, 1982).

Convergent validity was assessed through the correlations (Spearman's ρ) of the BESAA scores with actual-ideal body discrepancy and eating pathology scores. Spearman's ρ was preferred to Pearson's r as the data were skewed.

Analyses were conducted separately for girls and boys, given the gendered nature of Indian society (Batra & Reio, 2016) and previous research in other countries indicating

gender differences in the nature of body image among girls and boys (e.g. Khor, et al., 2009; Mitchinson et al., 2017; Nagata et al. 2019). Thus we made no a priori assumptions that girls and boys would relate to the items in the BESAA in a similar way. Gender specific analyses were supplemented with analyses involving only the items that were present in both scales validated with each gender, which were shown to be measurement invariant and therefore allowed for direct score comparisons across genders.

Results

Girls

Test-retest reliability at the item level. Test-retest analyses on item level showed that Cohen's weighted Kappa coefficient varied from .29 to .68 (see Table S1). Only one item, I12, had unsatisfactory Kappa below the acceptable .40 (Landis & Koch, 1977). For the rest of the items, Kappa indicated moderate to substantial agreement according to Landis and Koch (1977). Additionally, the Psi coefficient ranged from .74 to .80, indicating satisfactory stability. Item I12 ('I feel I weigh the right amount for my height') was removed from the scale and the remaining seventeen items were used in further analysis.

Factor structure. EFA for categorical items was performed on a random half of the sample of participants who identified as female ($n = 317$). Three eigenvalues were above 1 (6.13, 2.54 and 1.97), which suggests up to three factors according to Kaiser's criterion (Kaiser, 1960). This was confirmed by parallel analysis (for categorical data using bootstrap), which indicated that the three-factor solution was suitable for the data (please see Scree plot in Figure S1). The goodness of fit indices indicated close fit ($\text{rel } \chi^2 = 2.18$, RMSEA = .077, CFI = .954, TLI = .924, SRMR = .054). Table 1 presents the loadings per factor (promax rotation), which were labelled as 'Appearance-Positive', 'Appearance-Negative', and 'Weight'.

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CFA was next performed on the other random split half of the sample ($n = 324$). The one-factor solution was first evaluated to assess whether the scale is unidimensional, and demonstrated unsatisfactory fit indices (relative $\chi^2 = 6.515$, RMSEA = .166, CFI = .716, TLI = .669, SRMR = .127). Subsequently, the three-factor solution that was suggested by EFA was tested and demonstrated close fit (relative $\chi^2 = 2.10$, RMSEA = .074, CFI = .945, TLI = .934, SRMR = .062). For the CFA factor loadings, see Table 1.

Reliability. The BESAA subscales and the total score demonstrated satisfactory internal consistency with Cronbach's alpha of above 0.7 (Table 2). Item-total correlations were inspected at factor level and revealed no problematic items (See Table S2). With regard to test-retest stability, the total BESAA score and its subscales had an ICC that ranged from .65 to .78 (See Table S3), indicating satisfactory stability.

Concurrent Validity. As expected, BESAA total scores showed a strong positive correlation with each of the three BESAA subscales. Similarly, each of the subscales were weak-to-moderately positively correlated with one another. The BESAA total score and weight subscale showed moderate negative correlations with actual-ideal body discrepancy. Concurrent validity was also evident via the moderate-to-strong negative correlations between BESAA total (and its subscales) with both the subscales of the EDE-Q (See Table 2).

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Boys

Test-retest reliability. Test-retest analyses on item level produced Cohen's weighted Kappa coefficient from .08 to .46 (See Table S4). This revealed eight problematic items, I01, I03, I04, I05, I08, I11, I12, and I13, which had Kappa below the acceptable .40. For the rest of the items, Kappa indicated moderate agreement according to Landis and Koch (1977). Based on those results, it was decided that items I01, I03, I04, I05, I08, I11, I12, and I13

should be removed from the scale. Test-retest reliability was acceptable for the remaining eleven items.

Factor structure. Exploratory factor analysis for categorical items was performed on a random half of the sample who identified as male ($n = 392$). Three eigenvalues were larger than 1 (3.38, 1.75 and 1.34). Although the Kaiser-Guttman criterion suggests up to three factors (Kaiser, 1960), parallel analysis clearly emphasizes the suitability of a two-factor solution for our data (please see Scree plot in Figure S2). Both three- and two-factor solutions were assessed in order to evaluate loadings and goodness of fit indices. The three-factor solution had satisfactory goodness of fit indices but cross-loadings were present and one of the factors contained two items only, which is not advisable as its reliability (naturally depending on the number of items per factor) is low and the factor is less likely to replicate (Raubenheimer, 2004). Therefore, the two-factor solution was preferred, which was also suggested by parallel analysis. Items that loaded above .25 on multiple factors were deleted one by one, to reach a simple and robust factor structure. Omission of additional items (based on low loadings, high cross loadings and goodness of fit criteria) produced a two-factor solution with satisfactory fit (relative $\chi^2 = 2.062$, RMSEA = .061, CFI = .987, TLI = .967, SRMR = .044). Table 3 demonstrates the loadings of the items on the factors (Oblimin rotation), according to which they were named: ‘Appearance-Negative’ and ‘Appearance-Positive’.

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Confirmatory factor analysis was next performed on the other random half of the sample ($n = 324$). The unidimensionality of the scale was first checked by running a one factor solution, which did not have good fit (relative $\chi^2 = 10.707$, RMSEA = .195, CFI = .644, TLI = .466, SRMR = .115). The two factor solution that was suggested by EFA was tested by CFA and emerged close fit (Table 3; relative $\chi^2 = 1.700$, RMSEA = .052, CFI = .976, TLI = .962, SRMR = .041). For CFA factor loadings, see Table 3.

Reliability. With respect to internal consistency, Cronbach's alpha was .64 for the Appearance-Positive subscale, .55 for the Appearance-Negative subscale, and .58 for the total scale (Table S5). These values indicate acceptable internal consistency, taking into account the small number of items per subscale. Item-total correlations were inspected at factor level and revealed no problematic items (Table S5). With respect to test-retest stability, the total BESAA score and its subscales had an ICC ranging from .53 to .57 (Table S6).

Concurrent validity. The correlation coefficients between BESAA total and its subscales, as well as actual-ideal body discrepancy scores were found to be weak (Table 4). Evidence for convergent validity was provided via the moderate significant negative correlations between the BESAA total and 'Appearance-Negative' subscale scores with both the EDE-Q subscale scores. There was also a weak negative significant correlation between the 'Appearance-Negative' subscale of the BESAA and both the EDE-Q subscale scores. When accounting for attenuation, correlations increased in magnitude by 0.07 to 0.2.

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Comparing genders

While the boys' and girls' versions appear to share two factors (appearance positive and negative factors), these are not identical as they are constructed by different number of items. These should more accurately be named and considered as boys' appearance factors and girls' appearance factors. In addition, the girls' version includes a third factor (weight) that fits well for the girls' data but not the boys' data. Therefore, our analysis suggests that to measure the traits more accurately, different sets of items need to be used per gender. However, there is often a pragmatic need to compare genders in a study. To do this, researchers would naturally have to compare factors (and thus items) common to both genders. As such, we sought to establish whether there was a model that fit well in both genders, in addition to being measurement invariant (i.e., have no bias) across genders.

Factor structure. The next step in our analysis was to evaluate the fit of a version which consist of the common items for boys and girls. The common items across male and female versions of BESAA were the items used in the male version: I10, I16, I09, I14, I18, I02, and I17. The model that had close fit for males (see Section, Boys, Factor structure) also had a close fit for the girls data (relative $\chi^2=2.1$, RMSEA=.074, CFI=.96, TLI=.94, SRMR=.038) and for the entire (boys and girls together, $n= 1435$) sample (relative $\chi^2 = 3.97$, RMSEA = .045, CFI = .982, TLI = 0.971, SRMR = 0.025), therefore suggesting gender neutral positive and negative appearance factors (CFA factor loadings are presented in Table S7).

Measurement invariance. The gender neutral BESAA was invariant with respect to gender (all direct effects of gender on the items were non-significant). Therefore, the total scores of the common items version can be compared between girls and boys without measurement bias. The expected mean difference between girls ($M=3.85$, $SD=.74$) and boys ($M=3.97$, $SD=.67$) was .12 (95% CI for the difference: [.05, .20]), which was statistically significant ($t=3.28$, $df = 1302.36$, $p<.001$).

Internal consistency reliability. Cronbach's alpha for the BESAA total scale with common items across genders had moderate internal consistency ($\alpha=.622$), which was also demonstrated at the factor level: Appearance-Positive ($\alpha=.66$), and Appearance-Negative ($\alpha=.57$). Item-total correlations were inspected at the factor level and revealed no problematic items (Table S8). Table S9 presents the correlations between the gender-neutral and girl-specific factors for females, which ranged moderately high to high, with the same labelled factors correlating strongly (>0.80). This was expected, based on premise that the items comprising the neutral versions of the factors are a subset of those used in the girl-specific versions.

Discussion

The present study is the first (to the authors' knowledge) to culturally adapt and investigate the psychometric properties of a body image measure among urban adolescents in India. Specifically, this study adapted the Appearance and Weight subscales of the BESAA for use among Indian adolescents in English, and subsequently examined the factor structure, reliability, and construct validity, for boys and girls, separately, as well as assessing a gender-invariant, common item version for use across genders.

The Body Esteem Scale among Indian adolescents

Among girls, a 15-item, three-factor solution proved best fit for the data. First, nine items from the original Appearance subscale of the BESAA created two separate subscales regarding appearance; positive thoughts about appearance (Appearance-Positive) and negative thoughts about appearance (Appearance-Negative). In addition, two items that loaded onto the Weight subscale in the original validation study (Mendelson, et al., 2001), 'I am proud of my body' and 'I think I have a good-looking body', also loaded on the Appearance-Positive subscale. The latter makes sense conceptually and has been found in populations elsewhere (Cragun, DeBate, Ata, & Thompson, 2013).

Given recent developments in the conceptualisation of body image as having distinct negative and positive components (Tylka & Wood-Barcalow, 2015a), it is perhaps unsurprising to find the Appearance subscale of BESAA divided into positive and negative components in the present study. Whilst not strictly considered a measure of positive body image, due to omitting central concepts such as body functionality and embodiment (Piran, 2016), the BESAA has been recognised as capturing some aspects of positive body image (Guest et al., 2019). As such, it may be that the positive and negative aspects of body image are even more distinct in an Indian adolescent sample. It may also be a cultural nuance, with

humility being a particularly important and respected personal attribute throughout Indian culture (Bhattacharya, Chatterjee, & Basu, 2017). Indian adolescents may find it more difficult to endorse positively worded items in a confident and self-affirming way. An important avenue for future research will be to unpack these positive and negative aspects of body image among Indian adolescents, in an effort to understand the underlying reasoning behind this unexpected finding.

The third subscale among girls, labelled Weight, consisted of four items from the original Weight subscale of the BESAA (Mendelson, et al., 2001). The four items displayed high internal consistency, with weak correlations with the Appearance-Negative and Appearance-Positive subscales; similar to the findings of the original validation study (Mendelson, et al., 2001). The four-item Weight subscale can be considered a robust tool in measuring weight esteem among adolescent girls in urban India. Given a rise in the reporting of weight concerns and disordered eating among Indian girls and women (Dhillon & Dhawan, 2011; Priya, Prasanna, Sucharitha, & Vaz, 2010; Som, Mishra & Mukhopadhyay, 2016; Vaidyanathan, et al., 2019), this subscale could prove useful in future research addressing such concerns.

Among boys, two subscales were found: Appearance-Positive and Appearance-Negative. A total of eight items were removed from the original scale due to low test-retest reliability, and a further three items to achieve a stable factor structure. Three items removed for boys included the three items also removed for girls. Items loaded on the male subscales in the same manner as the girls, with the exception of one item, 'Checking my weight makes me sad', which loaded onto Appearance-Negative subscale. Unlike the girls, the scale total and Appearance-Negative subscale had only marginally satisfactory internal consistencies, suggestive that the BESAA is not fully capturing the appearance concerns among Indian boys. A qualitative exploration of the body image concerns of adolescent boys in India is

warranted. It may be that items relating specifically to build and muscularity are required given the previously noted desire for these attributes among Indian adolescent males (Cragun et al., 2013, Singh, Ashok, Binu, Parsekar, & Bhumika, 2015).

Interestingly, among boys, no Weight subscale was identified. These findings could be interpreted in a number of ways. It could be that the current weight items in the BESAA do not focus on aspects of weight that are important to Indian adolescent boys, and additional items are required. Given the low test-retest reliability of some of the items, it could also be that body weight is not a salient body image characteristic for boys in India, although a number of studies challenge this proposition (Sjostedt, Schumaker, & Nathawat, 1998; Stigler et al., 2011). Many companies and brands promoting weight loss in India are targeted towards female audiences (Zimik, 2016) and weight concerns may therefore be a predominantly gendered concern. Given the levels of muscularity portrayed in Indian mainstream cinema, it is likely that Indian boys are more concerned about gaining weight than losing it. This is supported by the fact that 20% of boys and men between the ages of 15 and 49 are malnourished in India (IIPS and Macro International, 2016). Evidently, further research is required to understand the relevance of weight concerns among adolescent boys in India.

In addition to investigating the factor structure of the BESAA among girls and boys, this study aimed to develop a common-item measure of BESAA that will allow for total scores to be compared across genders. The comparison across genders is feasible due to the complete measurement invariance of the scale, that is no direct effects of gender on item (all direct effects of gender on the items were non-significant) was detected using MIMIC model. These analyses resulted in the creation of a 7-item psychometrically sound, gender-invariant scale for use among girls and boys, using the common items from the female and male validation analyses.

Concurrent Validity

Regarding construct validity for girls, as theoretically predicted, BESAA scores significantly and negatively correlated with actual-ideal body discrepancy and eating pathology. Perhaps unsurprisingly, the relationship between the Appearance-Positive subscales and measures of convergent validity were weaker than that of the Appearance-Negative, Weight, and total BESAA scores. No hypotheses were postulated for the specific relationship between the Appearance-Positive subscale and convergent validity measures as this scale did not exist in the original measure and only emerged during our analyses. The weak association is likely due to positive feelings about appearance tending to be weaker predictors of weight discrepancy scores and eating pathology scores compared with negative feelings and perceptions about the body (Tylka & Wood-Barcalow, 2015b).

Among boys, a similar pattern emerged; the BESAA and its subscales were correlated with both actual-ideal body discrepancy and eating pathology scores in the anticipated direction. Like girls, the Appearance-Positive subscale had the weakest relationship with all convergent validity measures; again, likely reflecting what has been found elsewhere in relation to positive feelings about the body (Tylka & Wood-Barcalow, 2015b).

Methodological Considerations

This study should be interpreted in light of a number of limitations. Firstly, our sample cannot be considered representative of all adolescents across India. The sample was drawn from students attending English-taught schools in relatively high income, urban regions of North India. India has a rich and diverse cultural, political, linguistic, and economic landscape, and therefore, additional research is required to examine how the BESAA may perform differently in other regions and languages in India, and among those of a lower socio-economic demographic. Second, there was a lack of psychometrically sound scales among Indian adolescents to allow for an accurate assessment of construct validity. This study utilised a method of concurrently validating the BESAA with other body-image

related measures, including Eating Disorder Examination Questionnaire (EDE-Q: XX, 2020).

The newly formed factor structure of the EDE-Q was then used as a valid assessment of convergent validity in the present study. This is the preferred strategy to assess construct validity when few to no measures are psychometrically validated among the population under study (Swami & Barron, 2019). In addition, we utilised the Child Figure Rating Scale as an additional measure of construct validity, despite its own lack of validation among Indian adolescents. Finally, this study sought to validate two of the three subscales present in the original BESAA (Mendelson, Mendelson, & White, 2001), and thus we recognise that by removing a subscale we may have fundamentally altered the scale.

Implications for Future Research and Practice in India

Whilst shown to be a stable and reliable measure, due to the suboptimal internal consistency among boys, it must be recognised that the scale in its current form may not be capturing all elements of body image concerns among boys; further refinement may strengthen the scale for boys. To further our understanding of body image concerns among boys in India, a bottom-up approach to the development of a scale may be better able to capture these concerns (Brislin, Lonner, & Thorndike, 1973). This would facilitate understanding of the nature and relevance of body image concerns through the lens of the target population. This could involve focus groups, interviews and ethnographic studies, for example. This approach would move away from a theoretical framework developed from other populations (which, in the case of the BESAA, was Canadian adolescents (Mendelson, et al., 2001)) into a more exploratory study of the cultural nuances present in India. Whilst this approach may be favourable in some respects, it has the potential to reduce the generalisability of findings across cultures, contexts or regions, thus making cross-cultural observations and comparisons problematic. However, it might provide a fruitful next step in

understanding and developing additional tools to assess body image among adolescent boys in India.

The BESAA may provide an useful tool to aide understanding and development of interventions for public, mental and physical health issues in India, such as the rise of disordered eating practices (Tendulkar et al., 2006), the growing demand for skin lightening products (Rehman, 2019), and the rapidly changing landscape of agriculture, food, nutrition and health policy (Tzioumis & Adair, 2014). Understanding the role of body image within each of these issues could help guide interventionists through the lens of body image scholarship. At the very least, these tools could be used to ensure that interventions designed to address such public health issues do no harm to the body image of Indian adolescents. Moreover, the BESAA could provide the foundations for future body image work in India, and could be used as a tool to evaluate interventions to improve body image among this population.

Conclusion

In conclusion, the present study found a robust three-factor and an acceptable two-factor structure of the BESAA, among urban adolescent Indian girls and boys, respectively. A two-factor, 7-item measure of the BESAA was found to be internally reliable across both genders, and therefore can be utilised comparatively across genders. These three versions of the BESAA can be considered useful tools to explore body image concerns among adolescents in India. As well as notable face validity, the BESAA takes a holistic and general approach to body image, unlike other body image measures currently utilised in India that focus solely on body weight and shape. Culturally nuanced aspects of body image, such as skin colour, height and body hair, can be captured in the BESAA due to the broad nature of the items, making it a strong and arguably preferable measure to assess body image concerns in a culturally diverse setting such as India.

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Table 1. EFA loadings (Promax rotation) for the first split half (n=317) and CFA loadings (in parentheses) for the second split half (n=324) for girls.

Label	Item	Appearance Positive	Appearance Negative	Weight
I like what I look like in pictures (photos)	I01	.746 (.494)		
I like what I see when I look in the mirror	I04	.738 (.583)		
I am proud of my body	I02	.636 (.723)		
I think I have a good looking body	I17	.593 (.691)		
I look as nice as I'd like to	I18	.562 (.724)		
My weight makes me unhappy	I15*			.869 (.879)
Checking my weight makes me sad	I14*			.793 (.890)
I am satisfied (happy) with my weight	I06			.79 (.833)
I really like what I weigh	I08	.261		.671 (.681)
I wish I looked better	I07*		.739 (.591)	
There are lots of things I would change about my looks if I could	I05*		.682 (.629)	
I wish I looked like someone else	I09*		.665 (.568)	
My looks upset me	I10*		.656 (.815)	
I worry about the way I look	I16*		.565 (.683)	
I feel bad/shame about the way I look	I13*		.526 (.900)	

*Recoded item

Note. Blank cells indicate that the factor loading was below .25.

Table 2. Internal consistency, mean scores, and correlations between total score, new subscales BESAA (Girls) and construct validity measures, for girls (n=620).

		Cronbach's alpha	Mean (SD)	1	2	3	4
1.	Total BESAA score	.8	3.67 (.68)				
2.	Appearance Positive	.74	3.63 (.88)	.63**			
3.	Weight	.80	3.66 (1.13)	.73**	.27**		
4.	Appearance Negative	.73	3.69 (.85)	.72**	.16**	.34**	
5.	Actual-ideal body discrepancy		-21 (2.69)	-.3**	-.11**	-.4**	-.15**
6.	EDE-Q: Preoccupation and Control	.84	1.63 (.68)	-.45**	-.09**	-.36**	-.53**
7.	EDE-Q: Weight and Shape Concerns	.90	2.10 (1.30)	-.57**	-.21**	-.43**	-.60**

**All values are significant

Table 3. EFA loadings (Oblimin rotation) for the first split half (N=392) and CFA loadings (in parentheses) for the second split half (n=324) for boys.

Label	Item	Negative appearance	Positive appearance
My looks upset me	I10*	.722 (.763)	
I worry about the way I look	I16*	.703 (.688)	
I wish I looked like someone else	I09*	.508 (.456)	
Checking my weight makes me sad	I14*	.487 (.512)	
I look as nice as I'd like to	I18		.721 (.666)
I am proud of my body	I02		.460 (.567)
I think I have a good looking body	I17		.864 (.886)

Note. Blank cells indicate that the factor loading was below .25.

*Recoded item

Table 4. Internal consistency, mean scores, and correlations between total score, new subscales BESAA (Boys) and convergent measures, for boys (N=751).

	Cronbach's alpha	Mean (SD)	1	2	3
1. Total BESAA	.58	3.97 (.67)			
2. Appearance Positive	.64	3.72 (.98)	.74**		
3. Appearance Negative	.55	4.17 (.79)	.74**	.16**	
4. Actual-ideal body discrepancy	N/A	-.71 (2.63)			
5. EDE-Q: Preoccupation and Control	.88	1.71 (.68)	-.13** (-.23**)	-.07 (-.15)	-.14** (-.26**)
6. EDE-Q: Weight and Shape Concerns	.87	2.01 (1.21)	-.36**(-.53**)	-.18** (-.27**)	-.37** (-.54**)
			-.41** (-.59**)	-.22** (-.29**)	-.41** (-.61**)

**All values are significant; correlations in brackets were corrected for attenuation