Adaptation and validation of the Body Image Life Disengagement Questionnaire (BILD-Q) for use in english among adolescents in urban India

Farheen Hasan [a], Kirsty M. Garbett [a], Phillippa C. Diedrichs [a], Anshula Chaudhry [a], Latika Ahuja [a], Eleanora Uglik-Marucha [b], Silia Vitoratou [b], Megha Dhillon [d], Hemal Shroff [c], Helena Lewis-Smith [a,*]

[a] Centre for Appearance Research, University of the West of England, Bristol, United Kindom
[b] Psychometrics and Measurement Lab, Biostatistics and Health Informatics Department, Institute of Psychiatry, Psychology and Neuroscience, King's College, London SE5 8AB, United Kingdom
[c] Toronto District School Board, Ontario Canada
[d] Lady Shri Ram College, University of Delhi, India

ABSTRACT

Body image concerns are a global issue among adolescents, including in India. These concerns can prevent adolescents from engaging in everyday life activities, impeding social and academic development. However, at present, there are no psychometrically valid measures to assess such impact in the Indian context. This study culturally adapted and validated the Body Image Life Disengagement Questionnaire (BILD-Q) for use in English among adolescents in urban India. A total of 1427 adolescents completed an adapted version of the BILD-Q along with additional measures pertaining to body image. Exploratory factor analysis identified one dimension of body image life disengagement, which provided the best fit. The 9-item one-factor model was further supported by confirmatory factor analysis. The scale demonstrated good internal consistency and test re-test reliability. Further analysis demonstrated that the scale can be used to compare scores between boys and girls without measurement bias. This study presents a culturally adapted version of the BILD-Q, which can be used as a valid and reliable measure to assess the impact of body image concerns on life disengagement among English-speaking adolescents in urban India.

1. Introduction

Body image concerns are an issue for adolescents globally (e.g., Maezono et al., 2019; Moehlecke et al., 2020; Shagar et al., 2019; Swami et al., 2010), including in urban India (Deshmukh & Kulkarni, 2017; Dhillon & Dhawan, 2011; Ganesan et al., 2018; Rekha & Maran, 2012; Singh et al., 2016). Research suggests that up to 79% of girls and 38% of boys in India are unhappy with their appearance (Hedaoo & Gavaravarapu, 2020). The nature of these concerns relates mostly to weight among girls, muscularity among boys, and skin colour, height, and body hair among both genders (Gupta et al., 2001; Johnson et al., 2015; Peltzer et al., 2016; Phadke, 2017; Shroff & Thompson, 2004; Singh et al., 2016; Stigler et al., 2011; Swami et al., 2010).

The physical and mental health impacts of body image concerns are well understood in high-income Western countries (e.g., depression, anxiety, disordered eating, drug misuse, self-harm; Bornioli, 2019; Lewis-Smith et al., 2020; Neumark-Sztainer et al., 2006; Swami et al., 2010), with these impacts becoming gradually recognised in India (e.g., Ganesan et al., 2018; Singh & Parsekar, & Bhumika, 2016; Soohinda et al., 2019). In addition to physical and mental health consequences, research also highlights adverse life impacts of body image concerns. As a result of feeling unhappy or ashamed of their appearance, adolescents may avoid certain activities both inside and outside of school/work, such as participating in class, playing sports, or attending social events (Cash et al., 2005; Cash & Fleming, 2002; Halliwell et al., 2014; Mehra et al., 2022). Whilst this avoidance may provide immediate relief from any potential distress, it can also have the paradoxical consequence of reinforcing body image concerns and limiting life experiences that benefit individual development and psychological wellbeing (Atkinson & Diedrichs, 2021; Cash et al., 2005; Cash & Fleming, 2002). In India, withdrawal from life activities and events can be perceived particularly negatively, given Indian society's collectivistic nature and the

importance placed on peer relations and social approval (Akosah-Twumasi et al., 2018; Bowker & Raja, 2011). Despite there being increased recognition of the adverse and wide-raging consequences of body image concerns, there are limited measures available to reliably assess the impact of body image concerns on academic, social, and other areas of life disengagement among non-Western populations, including Indian adolescents.

To the authors' knowledge, there is only one brief measure that has been developed and validated to specifically assess the impact of body image concerns on life engagement among adolescents in the United Kingdom (UK; Atkinson & Diedrichs, 2021). The Body Image Life Disengagement Questionnaire (BILD-Q) was informed by a single question included in a large global survey conducted among girls across 13 countries by Dove (Unilever) in 2017 In collaboration with a market research agency, Dove conducted this survey to better understand life activities that girls may not engage in due to appearance concerns. The research question of interest asked "Which, if any, of the following, have you ever chosen NOT to do because you felt badly about how you looked?", where respondents were required to select any number of activities that applied from a list of 11 life activities (e.g., going to school, participating in sports, voicing their opinion, and taking part in physical activities). The life activities were developed based on qualitative insights from focus group discussions and interviews conducted with women aged 20–55 years (n = 21) and girls aged 11–13 years (n = 6) across several countries, including the UK, Brazil, France, Indonesia, Japan, and China. The survey identified that up to eight in ten girls across the world were not taking part in key life activities due to concerns about their appearance (Dove, 2017). These findings highlighted the importance of validating a measure that could assess the impact of appearance concerns on day-to-day activities.

Following the survey, the life activity items were modified for early adolescents, specifically in school settings, and were adapted for psychometric testing by Atkinson and Diedrichs (2021). This led to the validation of a 9-item unidimensional measure found to reliably assess the impact of body image concerns on life disengagement among adolescents in the UK. Guided by insights from previous research conducted with adolescents, the items aimed to capture a broader range of life activities across academic (school attendance and participation), social (spending time with friends and family), and engagement with healthcare services (going to a doctor or school nurse). The response scale was based on a 4-point response scale (1 = not at all, 2 = a little bit, 3 = quite a bit, 4 = all the time). A mean score was calculated using all items, with higher scores indicating higher life disengagement. The BILD-Q demonstrated good internal consistency (Cronbach's alpha =.82) and test re-test reliability (two-way random, absolute agreement, intraclass correlation coefficient, ICC =.74).

The BILD-Q also demonstrated concurrent validity via its numerous significant correlations with related constructs. First, there were significant negative correlations with body esteem and body satisfaction, and a significant positive correlation with internalisation of appearance ideals. Additionally, a significant positive correlation was noted between the BILD-Q and the psychosocial impairment of disordered eating. Finally, the BILD-Q demonstrated a significant negative correlation with overall mental well-being and positive affect, and a significant positive correlation with negative affect. Whilst means and correlations relating to the constructs were not compared statistically across gender, girls generally had poorer outcomes (e.g., lower body esteem, lower mental wellbeing) and demonstrated stronger correlations between the BILD-Q and other constructs, than boys. Findings also demonstrated gender invariance of the BILD-Q across gender, indicating that the measure can be used comparatively across girls and boys.

Whilst there are other measures that examine the impact of body image concerns, they are not focused on life disengagement and its direct social and academic impact amongst adolescents. For example, the *Body Image Quality of Life Inventory* (Cash and Fleming, 2000) assesses body image impacts on physical and mental health functioning

(for instance, an individual's feelings of self-worth; how happy an individual feels everyday) but does not consider specific examples of life disengagement. Similarly, the *Clinical Impairment Assessment* (Bohn et al., 2008) examines the impact of weight and shape concern (as part of an eating disorder assessment) on various aspects of mental health (for example, 'Over the past 28 days, to what extent have your feelings about your eating, shape or weight made you upset?'), but does not explore broader life impacts. Further, the *Body Image Coping Strategies Inventory* (Cash et al., 2005) assesses the adoption of cognitive strategies to cope with body image concerns but does not refer to behavioural avoidance strategies. Finally, the *World Health Organisation Quality of Life Scale* (WHO, 2012) measures life disengagement, but the focus is on the broader aspect of quality of life, and how it is impacted by factors such as physical pain, social relationships, and the environment. In addition to not capturing the direct impact of body image concerns on life disengagement, this collection of existing measures is also limited by their primary validation in clinical settings, and their unduly length for completion by adolescents. The BILD-Q, therefore, offers an important brief measure to assess the construct of life disengagement amongst adolescents, filling a gap in the field.

Regarding appropriate measures for use in India, only one measure exploring the impact of mental health concerns on life disengagement has been validated in India. The World Health Organisation Quality of Life Scale (WHO QOL-BREF; Agnihotri et al., 2010) is an Indian adaptation of the WHO QOL global scale. It has four subscales, with one subscale assessing the 'psychological' domain ("*How satisfied are you with yourself?*") and only one question within addressing body image (*"Are you able to accept your bodily appearance?"*). Whilst this measure has been validated in Hindi among Indian adolescents (Agnihotri et al., 2010), it does not specifically examine the impact of body image concerns. Further, it focusses on the construct of quality of life more broadly, thus highlighting a gap in appropriate measures to assess the impact of body image concerns upon life engagement among Indian adolescents; despite existing research indicating adverse impacts (Baby et al., 2021; Jain & Tiwari, 2016; Menon & Pant, 2015; Soohinda et al., 2019).

The availability of such a measure is important, as whilst researchers and practitioners can reliably and accurately measure body image concerns among adolescents in India (due to an existing validated measure; Garbett et al., 2021), they are currently unable to assess its impact on life engagement. Therefore, the BILD-Q would facilitate a better understanding of body image and its impact on engagement with life activities among Indian adolescents, allowing practitioners to assess the need for suitable psychosocial and policy interventions to address these concerns.

1.1. The present study

The present study aimed to culturally adapt and validate the BILD-Q for use among Indian adolescents in urban settings. The measure was validated in English, which is one of the official languages of India, alongside Hindi (The Official Language Act, 1963). English validation of the BILD-Q ensures it is accessible to a large population of Indian adolescents across different regions of urban India, who communicate primarily in English (Mohanty & Panda, 2017).

The research aimed to test the psychometric properties (dimensionality, internal consistency and test-retest reliability, measurement invariance) of the BILD-Q and examine its relationship with other measures of body image (assessed by the Body Esteem Scale for Adults and Adolescents [BESAA; Garbett et al., 2021]) and eating pathology (assessed by the Eating Disorder Examination Questionnaire [EDE-Q; Lewis-Smith et al., 2021a]). These scales have previously been validated among Indian adolescents. The BILD-Q was reverse-scored in the present study, with higher scores indicating lower life disengagement. It was hypothesised that the BILD-Q would demonstrate moderate significant positive correlations with the BESAA and its subscales ('Positive

Appearance' and 'Negative Appearance'; with items on the latter sub-scale reverse scored) and moderate significant negative correlations with the EDE-Q and its subscales ('Preoccupation and Control' and 'Weight and Shape Concerns').

2. Methods

2.1. Participants

The sample consisted of 1427 adolescents (43.4% girls), aged 11–15 years (M = 12.88, SD =.85), across four urban private schools in Delhi and Ludhiana. More than half of the participants (58.8%; 1.5% missing) spoke a language other than Hindi at home. Most participants indicated their religion to be Hinduism (74.6%), followed by Sikhism (18.1%), other religion (2.5%), Islam (2%), Christianity (1.1%), and 1.7% did not provide a response. The most frequently reported highest qualification to be held by participants' mothers (35.5%; 11.8% missing) and fathers (35.2%; 12.4% missing) was a bachelor's degree. Only 3.8% of fathers and 4.6% of mothers were not educated to at least a degree level.

A subset of participants was asked to complete the questionnaire one week following the initial survey for test-retest investigations. Stability analyses were conducted on 243 participants with a mean age of 13.4 (SD=1), of which 59.8% were boys.

2.2. Test re-test sample

To assess test re-test reliability, the measures were re-administered to 243 participants (41% girls), with a mean age of 13.4 (SD=1), at a randomly selected school across grades 7, 8 and 9. Recommendations vary regarding the ideal time interval to test for measurement stability, ranging between 1 and 30 days (e.g., Polit, 2014; Streiner et al., 2015; Wyse, 2021). Whilst the original BILD-Q demonstrated similar stability at both one-week (overall =.70; boys =.77; girls =.62) and six-week (overall =.74; boys =.76; girls =.69) timepoints (Atkinson & Diedrichs, 2021), it was not possible to assess re-test reliability beyond one-week in the present study, due to practical and funding constraints associated with the project. Therefore, the BILD-Q was re-administered to students one week later, which has been considered an ideal time frame for younger populations (Anastasi & Urbina, 1997).

2.3. Procedure

Ethical approval was sought from the first author's university ethics committee (HAS.18.01.074). English-medium schools in urban Delhi were recruited through opportunistic sampling, via the fourth and eighth authors. Consent was obtained from either the parents or school principal, based on the school's discretion and in line with ethical protocol in India. The students were subsequently provided with a detailed information sheet and were given the opportunity to ask questions to the teachers and/or research assistants. Once students provided their assent, paper questionnaires were administered in classes by researcher assistants, who were trained by the second and last author. The questionnaires took approximately 30 minutes to complete. Schools received 13,500 Indian Rupees to thank them for their participation in the project; of which could be spent across multiple resources of their choice. Participants (i.e., the students) were not individually incentivised.

2.4. Measures

The present study was part of a larger programme of research aiming to concurrently validate several psychosocial measures among adolescents in urban India. Therefore, participants completed a battery of six different measures within a paper questionnaire, presented in the following order: the Positive Affect and Negative Affect Scale (Ebesutani, et al., 2012), Rosenberg Self-Esteem Scale (Rosenberg, 1965), EDE-Q (Lewis-Smith et al., 2021a), BILD-Q (Atkinson & Diedrichs,

2021), Social Attitudes Towards Appearance Questionnaire: Internalisation General subscale (Lewis-Smith et al., 2021b), and BESAA (Garbett et al., 2021). Nonetheless, the present study focuses on three of these measures (BILD-Q, BESAA, EDE-Q).

Measures of body image and eating pathology were selected to assess their associations with the BILD-Q and provide evidence on the nomological network of the measure. The BESAA was selected based on the existing evidence indicating body image concerns have negative life impacts among adolescents both inside and outside of work/school (Cash et al., 2005; Cash & Fleming, 2002; Halliwell et al., 2014). The EDE-Q was selected based on studies indicating a positive association between eating pathology and body image concerns in India (Ganesan et al., 2018; Singh et al., 2016). These measures underwent simultaneous (concurrent) psychometric evaluation (Garbett et al., 2021; Lewis-Smith et al., 2021a; Lewis-Smith et al., 2021b), following validation guidelines for the field (Swami & Barron, 2019).

2.4.1. BILD-Q

The Body Image Life Disengagement Questionnaire (BILD-Q) is a 9-item measure assessing the extent to which body image concerns have stopped individuals from engaging in life activities and events (Atkinson & Diedrichs, 2021). Example items include going 'to the doctor' and 'to school'. Reponses to the items are indicated using a 4-point ordinal scale, ranging from 1 (hasn't stopped me at all) to 4 (stopped me all the time). All items were averaged, with higher scores indicating higher life disengagement.

Prior to validating the measure, the items were adapted for use in India by the eighth and ninth authors. These changes were undertaken to make the items more appropriate and relevant to the Indian context. First, an extra item was added to the scale: 'participate in a team, club, or extracurricular activity, e.g., dance club, debate club', as Indian adolescents are encouraged to engage in activities outside of their academic requirements, to help with their overall development (Deb et al., 2015). Second, 'sauna' was removed from an existing item ('go to the beach, pool, sauna'), as this is not a common activity amongst Indian adolescents. Third, 'give an opinion or stand up for myself' was modified to 'give an opinion or express myself confidently (e.g. raise hand in class to ask a question, give a comment, public speaking)', to enhance comprehension. Lastly, 'school nurse' was omitted from an existing item ('go to the doctor or school nurse'), as school nurses are not common in Indian schools.

Next, the fourth author conducted cognitive interviews with 12 adolescents (50% girls) aged 11–15 years from a private secondary school in Delhi. This sample was balanced across gender, age, as well as literacy levels. In these interviews, students were asked to explain each item in their own words. If items were found to be challenging for the student, through conversation and explanation, the student and interviewee would agree on an alternative phrase. The cognitive interviews found no issues with comprehension of the items, allowing the items to be finalised.

2.4.2. BESAA

Body image was measured using the Body Esteem Scale for Adults and Adolescents (BESAA; Mendelson et al., 2021), validated for use among Indian adolescents (Garbett et al., 2021). This is a 15-item scale for girls and a 7-item scale for boys. Both scales include a Positive Appearance and Negative Appearance sub-scales, with the girls' scale having an additional Weight subscale. Some example items in the BESAA include 'My looks upset me' (Negative Appearance subscale), 'I like what I look like in pictures' (Positive Appearance subscale), and 'I am satisfied with my weight' (Weight subscale). Items are rated on a 5-point ordinal scale (1 = Never to 5 = Always). After reverse coding the applicable items, scores on all items are averaged and lower scores indicate lower body esteem. The BESAA has demonstrated good reliability within the Indian adolescent context (Garbett et al., 2021). The 7-item gender-inclusive version (see Garbett et al., 2021) of the BESAA

was used to assess its associations with the BILD-Q in this study. The internal consistencies for the total BESAA scale (α and ω = .63), the Negative Appearance subscale (4 items; α and ω = .58), and Positive Appearance subscale (3 items; α and ω = .69) were acceptable.

2.4.3. EDE-Q

Eating pathology was measured using the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994), which has been validated among Indian adolescents (Lewis-Smith et al., 2021a). There is a 15-item version for girls and an 18-item version for boys, which have demonstrated excellent reliability and test-retest reliability. Items are rated on a 4-point ordinal scale (0 = 0 days, 1 = 1–2 days, 2 = 3–5 days, 3 = 6–7 days), while the last 9 items (e.g., "How many times did you feel shame [guilty] eating food because it could affect your weight or shape?") are rated on a 7-point ordinal scale (1 = Not at all to 7 = Very much so). An average score was calculated for subscales and the global score, with higher scores indicating higher eating pathology. The 12-item gender-inclusive version (see Lewis-Smith et al., 2021a) of the scale was used to assess its associations with the BILD-Q in this study. The internal consistencies for the total EDE-Q scale (α and ω = .88), the Preoccupation and Control subscale (6 items: α and ω = .8), and Weight and Shape Concerns subscale (6 items; α and ω = .87) were excellent.

2.5. Statistical analyses

Analyses were conducted in M*plus* 8 (Muthen & Muthen, 1998–2017), SPSS (IBM Corp, 2017) and R version 1.31093 (R Core Team, 2020). The responses of 38 participants (2.5% of the sample) were omitted as they had more than 10% missing values, following Bennett (2001). Analyses were performed on 1427 participants, for which missing values ranged from 0.3–2.4%. Given the small percentage of missing values, we followed Kline et al. (2016), who suggests that when missingness is less than 5% of the total sample, missing values may be of little concern. Pairwise deletion was implemented to address incomplete data, as the data were missing completely at random, the missing data were low, and multiple imputation was considered unnecessary.

2.5.1. Dimensionality

Given that the BILD-Q had not been previously validated in diverse cultural contexts, and considering its novelty within the Indian culture, we conducted an assessment of its latent structure using exploratory factor analysis (EFA) for categorical data. The sample was first split into two random subsamples using a random number generator. The first split half was used for EFA. The suitability of the correlation matrix for factorisation was evaluated using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (a KMO value of ≥.80 suggests the data are suitable for factor analysis, as recommended by Kaiser, 1960, and Kaiser & Rice, 1974) and the Bartlett's test of sphericity, whereby a significant difference between the correlation matrix and the identity matrix indicates that the matrix is factorable (Bartlett, 1951). In EFA, the weighted least square mean and variance adjusted estimator (WLSMV; Muthén et al., 1997) was used, to accommodate the ordinal nature of the data (four-point ordinal scale) and the presence of strong floor effects, due to the low endorsement of most items (Kyriazos & Poga-Kyriazou, 2023; Muthén et al., 1997). The number of factors to retain was evaluated by following the Guttman-Kaiser criterion (Guttman, 1954; Kaiser, 1960) and parallel analysis criterion (Horn, 1965). The first suggests retaining as many factors as the number of eigenvalues of the sample covariance matrix that are above 1. Parallel analysis detects the eigenvalues of the sample covariance matrix that are larger than the eigenvalues across 100 randomly generated samples with the same number of observations and factors (using R package 'random.polychor.pa' for categorical data; Presaghi & Desimoni, 2019). The resulting eigenvalues were depicted using Cattell's (1966) scree plot. Item retention was guided by factor loadings of at least .4 on the main factor (Brown, 2015),

absence of cross-loadings (λ ≥ 0.25) on other factors, and assessment of item content by experts (content validity).

To verify the factor structure of the measure, the solution from EFA was tested on the second split half of the sample using confirmatory factor analysis (CFA) via WLSMV estimator. Further, the original model validated in the UK context (Atkinson & Diedrichs, 2021) was tested to assess its suitability within the Indian cultural context.

Goodness of fit indices were computed for both EFA and CFA to assess the absolute and incremental fit of suggested models. Recommended absolute fit indicators were the root-mean-square error of approximation (RMSEA), relative chi-square (relative χ^2), and Standardised Root Mean Square Residual (SRMR). Hu and Bentler (1999) recommend a value of RMSEA below.05 for close fit while Cangur and Ercan (2015) suggest a fit close to good is represented by values in the range of.05–.08. Relative χ^2 was calculated by dividing the test statistics by the degrees of freedom and indicates close fit when the ratio is below 2 (Ullman, 2001) and acceptable fit with values below 5 (Schumacher & Lomax, 2004). A cut off score of.10 for SRMR suggested acceptable fit, and values below.05 were indicators of close fit (Kline, 2016; Hu & Bentler, 1999). Indices used for assessing an incremental fit of the model were the comparative fit index (CFI) and the Tucker–Lewis index (TLI). Recommendations by Hu and Bentler (1999) suggested a value of.95 for each to indicate close fit, and a cut off value of.90 was advisable for acceptable fit (Cordon & Finney, 2006). The best fitting model was used for measurement invariance (non-bias) testing of the BILD-Q items across two genders adjusted for age using the multiple indicators. The multiple cause model (MIMIC; Muthén, 1979; Jöreskog & Goldberger, 1975) was employed for measurement invariance (non-bias) testing of the BILD-Q items across two genders adjusted for age.

2.5.2. Measurement invariance

Measurement invariance investigations are a fundamental step in the psychometric validation of a measure (Rosellini & Brown, 2021), and are a prerequisite to comparing group means according to many authors (e.g., Leitgöb et al., 2023). Given that studies show gender differences relating to body image concerns at a global level (Dye, 2016) and within the Indian context (Radwan, et al., 2019), it is crucial to confirm that the differences are genuine and not due to methodological bias (Davidov et al., 2014; Millsap, 2011; Van De Vijver et al., 2019) and that body image life disengagement is measured equivalently across boys and girls, adjusted for age. The multiple indicators, multiple causes (MIMIC; Muthén, 1979; Jöreskog & Goldberger, 1975) model was employed to examine gender-related measurement invariance while controlling for age; an approach not feasible with multiple-group CFA that can allow only for one (categorical) covariate at the time.

The best fitting model was used for gender-related measurement invariance (non-bias) testing of the BILD-Q items. The MIMIC model involves regressing observed variables (items) onto a covariate (here, gender) to estimate the direct effects of the covariate on these items. Measurement non-invariance, or bias, is identified for an item when a direct effect is statistically significant. This corresponds to scalar non-invariance (otherwise referred to as uniform differential item functioning in item response theory terminology), meaning that boys and girls with the same level of a latent trait (here, life disengagement) do not have the same probability of endorsing a particular indicator.

2.5.3. Reliability

Both Cronbach's alpha (α; Cronbach, 1951) and McDonald's omega (ω; McDonald, 1999) were used for estimating internal consistency reliability, to ensure that no crucial information regarding each scale's psychometric properties was omitted (Zinbarg et al., 2005). A value of.6 for each coefficient was used as the criterion for satisfactory internal consistency (Pallant, 2001). 95% bootstrap confidence intervals (CIs) for both coefficients were computed using the OMEGA macro for SPSS (Hayes & Coutts, 2020). Items were also inspected with respect to corrected item-total correlations (ITC), and alpha/omega if an item was

deleted (AID/OID). A range of values from.2 to.8 for ITC were considered an indicator of satisfactory internal consistency, while items with values of AID/OID above the total alpha/omega were considered problematic.

Stability of items across time (test-retest reliability) was examined at item level using the weighted kappa coefficient (k; Cohen, 1968) and the percentage of agreement. Items were retained if weighted kappa signified at least moderate agreement (k = .40–.60; Landis & Koch, 1977) and/or percentage of agreement was above.75. The mixed effects, absolute agreement intraclass correlation coefficient was used at subscale level (ICC; Koch, 1982) and Landis and Koch (1977) guidelines were followed for interpreting the results (>.80: very good agreement,.60 to.70: good agreement,.40 to.60: moderate agreement,.20–.40: fair agreement, <.20: poor agreement).

2.5.4. Associations with related measures

The relationships between the BILD-Q and measures of body image and eating pathology were examined using Spearman's rho.

3. Results

3.1. Endorsement

The descriptive indices for the final 9 items of BILD-Q are presented in Table 1. Notably, all items exhibited low endorsement, that is, responses at the 'hasn't stopped me at all' end of the scale. Specifically, 60.2% to 87.3% of participants who responded endorsed this option across the items. The least endorsed statements included 'spend time with friends and family' and 'go to school', with 87.3% and 80.7% of participants rating them as 1 ('hasn't stopped me at all').

3.2. Exploratory factor analysis

The data were suitable for factor analysis, as indicated by KMO of.85 and Bartlett's test of sphericity (x^2 =1732.175, df=45, p < .001). EFA for categorical items was conducted on the first random half of the sample (n = 704) using all 10 items. Two eigenvalues were above 1 (5.04, 1.04); suggesting up to two factors according to Guttman-Kaiser criterion. Parallel analysis for categorical data using bootstrap simulations suggested that a one-factor solution was suitable for our data (see Fig. S1 for

the scree plot), which was expected, as the second eigenvalue was close to 1.

The one-factor solution with all items in the model did not demonstrate close fit to the data (relative x^2 =6.05, RMSEA=.085 [90% CI.074,.096], CFI=.932, TLI=.913, SRMR=.084). The authors of the original questionnaire suggested that items I08 ("go to school") and/or I09 ("raise my hand in class") could be removed to address potential statistical redundancy, and to improve model fit. Therefore, we tested two models—one excluding item I08 and the other omitting I09. Omitting I08 resulted in less than adequate fit (relative x^2 =6.86, RMSEA=.091 [90% CI.079,.104], CFI=.923, TLI=.897, SRMR=.088), whereas omitting I09 resulted in close fit to the data (relative x^2 =3.17, RMSEA=.056 [90% CI.043,.069], CFI=.971, TLI=.961, SRMR=.065). The decision to omit item I09 has been further supported through internal discussions, whereby the research team concluded to omit item I09, as 'go to school (e.g., item I08)' partially encompasses item 09 'raising hand in class (i.e., item 109)' and encompasses a broader range of activities within the school setting. Parallel analysis was conducted on the reduced set of items, which still indicated a one-factor solution as appropriate for our data. All items were meaningful indicators of the latent variable of life disengagement ($\lambda \geq 0.446$; please see Table 1 for loadings). The factor structure of a nine-item scale was also investigated separately by gender. The Guttman-Kaiser criterion suggested up to 1 and 2 factors for boys (one eigenvalue above 1 = 4.55) and girls (two eigenvalues above 1 = 4.59, 1.08) respectively, while parallel analysis indicated one factor to be present in our data for both boys and girls (please see Fig. S1 and S2 in Supplementary Materials). In boys (N = 403), the one-factor structure demonstrated close fit to the data (relative x^2 =1.59, RMSEA=.038 [90% CI.013,.059], CFI=.99, TLI=.98, SRMR=.063), while in girls (N = 301) the fit was slightly worse than in boys but still considered adequate (relative x^2 =2.74, RMSEA=.076 [90% CI.053,.097], CFI=.95, TLI=.93, SRMR=.09). All factor loadings exceeded.4 in boys' and girls' solutions (please refer to Table 1 for details). As the fit in girls' data, although acceptable, was slightly less favourable than in boys' data, and the Guttman-Kaiser criterion suggested the potential for up to 2 factors, we conducted further exploration of the factor structure in girls' data. While the two-factor structure demonstrated a slightly better fit (relative x^2 =2.24, RMSEA=.064 [90% CI.038,.090], CFI=.97, TLI=.95, SRMR=.06), several items either exhibited loadings below acceptable levels ($\lambda < 0.4$), displayed cross-loadings on another factor, or both. Consequently, we accepted the one-factor solution for girls.

3.3. Confirmatory factor analysis

CFA for categorical data was conducted on the second random half of the sample (n = 723) to test the one-factor structure that had emerged from EFA. This demonstrated adequate fit to the data (relative χ^2=4.56, RMSEA=0.070 [90% CI.058,.083], CFI=.953, TLI=.937, SRMR=.051) and all items had strong loadings ($\lambda \geq 0.48$; please see Table 1 for standardised loadings). When examined separately by gender, the one-factor structure had adequate fit to the data among boys (N = 392; relative x^2 =3.48, RMSEA=.079 [90% CI.062,.097], CFI=.94, TLI=.92, SRMR=.06) and demonstrated close fit among girls (N = 331; relative x^2 =2.04, RMSEA=.056 [90% CI.035,.077], CFI=.97, TLI=.96, SRMR=.05). These findings support the unidimensional structure of the nine-item BILD-Q for both genders, whether considered together or separately.

The original model (Atkinson & Diedrichs, 2021), which used 9 items (without the item I05 – 'participate in a team, club, or extracurricular activity, e.g., dance club, debate club', which was added for the purposes of this study), was tested using CFA on the second random half of the sample (n = 723). The solution did not demonstrate acceptable fit to the data (relative χ^2= 11.41, RMSEA=.120 [90% CI.108,.132], CFI=.875, TLI=.833, SRMR=.076). The proceedings of the original authors were followed, and the structure was investigated separately by

Table 1

EFA (N = 704) and (standardised) CFA (N = 723) loadings for a one-factor solution of BILD-Q for both genders combined and separately.

Item	Label	Mean (SD)	Median (min-max)	EFA (CFA)		
				Both	Boys	Girls
I01	Beach or swimming pool	1.71 (1.03)	1 (1-4)	.446 (.480)	.467 (.457)	.411 (.516)
I02	Go to a social event	1.40 (0.83)	1 (1-4)	.726 (.768)	.687 (.718)	.784 (.833)
I03	Go shopping for clothes	1.44 (0.83)	1 (1-4)	.763 (.726)	.762 (.706)	.779 (.745)
I04	Physical activity or sports	1.45 (0.85)	1 (1-4)	.598 (.711)	.655 (.749)	.556 (.668)
I05	Extracurricular activity	1.59 (0.96)	1 (1-4)	.567 (.683)	.533 (.666)	.623 (.72)
I06	Give an opinion	1.61 (0.91)	1 (1-4)	.564 (.507)	.614 (.512)	.509 (.503)
I07	Go to the doctor	1.52 (0.90)	1 (1-4)	.610 (.523)	.645 (.514)	.572 (.534)
I08	Go to school	1.33 (0.77)	1 (1-4)	.818 (.742)	.795 (.771)	.848 (.692)
I10	Friends and family	1.24 (0.70)	1 (1-4)	.890 (.848)	.849 (.85)	.953 (.843)

Note. SD: standard deviation, EFA: exploratory factor analysis, CFA: confirmatory factor analysis. All items were significant, p < .001.

gender. Both boys (N = 392; relative x^2 = 6.19, RMSEA=.115 [90% CI.099,.132], CFI=.890, TLI=.853, SRMR=.076) and girls (N = 331; relative x^2 = 5.95, RMSEA=.122 [90% CI.104,.141], CFI=.858, TLI=.811, SRMR=.088) did not show acceptable fit to the data. Based on these findings, the one-factor structure model derived in this study was favoured over the model proposed by Atkinson and Diedrichs (2021).

3.4. Measurement invariance

The MIMIC model was used to test measurement invariance with respect to gender, adjusted for age, on the entire sample (N = 1427). Small significant direct effects were present for items I03 (de=−0.261; 'go shopping for clothes') and I04 (de=0.258; 'participate in a physical activity or sports'). For girls and boys with the same level of life disengagement, girls had higher levels of agreement than boys for item I03, whereas boys had higher probability of endorsing item I04 than girls. However, the effects were small (about 0.25 units on a 1 to 4 points scale), and moreover, they came in opposite directions. Therefore, we argue that these cancel out and they do not pose threats to the comparability of the derived scores across genders, adjusted for age. Boys scored significantly higher than girls on the total score of BILD-Q; thus, indicating higher life disengagement.

3.5. Reliability

Items had moderate agreement across time (0.4–0.6), as indicated by weighted Kappa (κ). The percentage agreement exceeded 75% for only two items (I08, I10). However, the acceptable agreement provided by κ for the rest of the items highlighted stability in time for all items. The ICC for the total score was.73, indicating good agreement according to Landis and Koch (1977).

Cronbach's alpha and McDonald's omega were not different and indicated satisfactory internal consistency of the scale (α, ω = .78 [95% bootstrap CI.75,.81]). ITC were in a satisfactory range and no problematic items were identified by AID/OID, suggesting high internal consistency at item level. Please see Table 2 for reliability indices.

3.6. Associations with related measures

The BILD-Q scores were correlated with common versions (that is, items common for both girls and boys) of the EDE-Q and BESAA and their subscales, which indicated significant and weak correlations with all measures (please see Table S2).

Table 2
Reliability (stability and internal consistency) indices of BILD-Q per item.

Item	Label	Stability (n = 243)		Internal consistency (N = 1427)		
		Weighted kappa	% agreement	ITC	AID	OID
I01	Beach or swimming pool	0.49	55.9	.358	.782	.78
I02	Go to a social event	0.56	70.8	.560	.749	.75
I03	Go shopping for clothes	0.50	72.8	.547	.751	.75
I04	Physical activity or sports	0.51	65.4	.476	.761	.76
I05	Extracurricular activity	0.42	65.4	.480	.760	.76
I06	Give an opinion	0.39	57.2	.386	.774	.77
I07	Go to the doctor	0.60	69.3	.392	.773	.77
I08	Go to school	0.56	81.9	.535	.754	.75
I10	Friends and family	0.47	85.4	.571	.752	.75

Note. ITC: item-total correlations, AID: alpha if item deleted, OID: omega if item deleted.

4. Discussion

This is the first study to culturally adapt and validate the BILD-Q among adolescents in urban India. Specifically, this involved adapting the measure, and subsequently examining its psychometric properties with respect to factor structure, internal consistency and test-retest reliability. The analyses revealed a 9-item, one-factor, psychometrically sound and gender-invariant English scale to assess life disengagement due to body image concerns among adolescents in urban India.

The BILD-Q was administered amongst Indian adolescents as a 10-item measure, whereby 9 items constituted the original measure, and a further item (I05, 'participate in a team, club, or extracurricular activity, e.g., dance club, debate club') was added during the validation process. Removal of the original item 109, 'raise my hand in class', improved fit, thus suggesting that this item was redundant among Indian adolescents. This could be due to hand raising in class not being perceived as distinct from the item 'going to school', as both items demonstrate academic proactiveness, and might be viewed as conceptually similar by the students. Nonetheless, all other items being retained indicates that the original items with some minor cultural adaptations were appropriate for the Indian context. This suggests that adolescents in urban India value attending social events and taking part in extracurricular activities (e.g., physical activity; Bowker & Raja, 2011; Satija et al., 2018; Singh & Misra, 2016). However, it is important to consider that adolescents may view engagement in these activities as a means by which to achieve their academic goals and meet parental expectations, instead of for their personal development, as it is often perceived in the West (Nagle & Sharma, 2018). This is an important contradiction with Western culture, which is inherently individualistic, whereby Indian culture places significant emphasis on honouring societal expectations, as well as parental requirements to fulfil academic and career goals (Akosah-Twumasi et al., 2018; Nagle & Sharma, 2018). Additionally, the items related to 'going to school' and 'spending time with friends and family' loaded strongly, whereas the item about 'going to beach or swimming pool' loaded the lowest of all items. This affirms that importance of social engagement for adolescents in urban India, as well as their lack of access to swimming pools, and the beach, which is not easily accessible in land-locked Delhi.

The overall BILD-Q means for boys and girls indicated generally low levels of body image-related life disengagement among Indian adolescents. This mirrors previous findings from research that utilised the BILD-Q among separate samples of Indian adolescents (Garbett et al., 2021; Lewis-Smith, 2023).[1] However, some items (i.e., scenarios) on the BILD-Q were related to higher levels of life disengagement than others, such as, 'going to the beach or swimming pool'. Whilst acknowledging the caveat above relating to the likely lack of access to pools and beaches, it is also unsurprising that concerns about appearance would impede this activity the most. Whilst research exploring body image within this context is lacking among Indian adolescents, Western studies highlight how adolescents can feel self-conscious and embarrassed at the pool or beach due to greater visibility of their body (due to wearing minimal clothing/tight swimsuits; e.g., Vani et al., 2020). This might explain why the present group of Indian adolescents were least likely to engage in this activity due to appearance concerns, however, future research is needed to explore this further. On the converse, other items were related to lower levels of life disengagement, such as 'spending time with family and friends'. Appearance concerns may have less influence on this scenario due to the probability that adolescents feel more comfortable with family and friends, who likely value them for qualities beyond their appearance and act as sources of support (Apostolou et al., 2020). Relatedly, all other scenarios in the BILD-Q (e.g., 'going shopping

---

[1] These were two separate intervention evaluation studies that utilised the validated BILD-Q. Comparisons were made with the baselines data of both studies.

for clothes', 'participating in a team, club, or extracurricular activity') could be interpreted as involving strangers and/or other people that these adolescents feel less comfortable with. Such scenarios may elevate anxiety if an adolescent is experiencing appearance concerns, due to potentially feeling a lack of confidence or fearing drawing attention to their appearance. Nonetheless, these are suppositions that require further exploration among Indian adolescents.

The BILD-Q can be used comparatively across boys and girls in the Indian context without gender bias. However, it was noteworthy that boys experienced significantly higher life disengagement than girls, indicating that whilst body image concerns can lead to life disengagement among both genders, this has greater salience for boys. This contradicts the findings from the original measure, which indicated higher disengagement amongst girls, as compared to boys (Atkinson & Diedrichs, 2021). This adds an important finding to the literature, which currently includes limited understanding of body image concerns in Indian adolescent boys. Additionally, the lower disengagement among girls could be due to greater societal pressure to avoid physical activities and to spend more time at home (due to safety concerns; Satija et al., 2018). As a result, girls may already have pre-existing lower participation in sports, activities, and public speaking, as compared to boys, likely due to deep-rooted gender stereotypes in India (Satija et al., 2018; Waghachavare, Dhumale, & Kadam, 2021). Therefore, their body image concerns might be less influential on their participation in these activities. However, more research is required to understand this further.

The BILD-Q demonstrated significant associations with gender-invariant versions of the EDE-Q and BESAA (including their subscales), mirroring findings from the original BILD-Q development study (Atkinson & Diedrichs, 2021). However, the original BILD-Q demonstrated stronger associations with the BESAA and a measure of eating behaviours, as compared to the present study. Further, whilst moderate correlations were expected between the BILD-Q and both the EDE-Q and BESAA, findings revealed lower correlations. This is perhaps unsurprising, given the limited availability of measures that have been validated in the Indian context and pertain to the similar construct of body image-related life disengagement. This highlights the importance of validating further psychosocial measures for the Indian context.

Nonetheless, the finding that higher life disengagement due to body image concerns had a significant (albeit, weak) association with lower body esteem supports previous research. Indeed, findings indicate that adolescents in India face appearance-based concerns (with girls facing fear of having darker skin, and boys being dissatisfied with their height), that lead to avoidance of physical activities, and thus supports that Indian adolescents *do* experience avoidance of activities due to body image concerns (Satija et al., 2018; Singh & Misra, 2016). With relation to disordered eating behaviours, findings from India suggest that at least half the population with disordered eating has a co-morbidity, with depression being the most common (Vaidyanathan et al., 2019). It is understood that social withdrawal and disengagement is related to low mood, alongside body image concerns, and suggests that life disengagement due to body image concerns can be related to disordered eating. However, at present, there is limited research on eating disorders and life disengagement in India, and more work is required to better understand the relationship between the two constructs (Antaramian et al., 2016; Chandra et al., 2012).

4.1. Methodological considerations and implications

This study is the first to validate a measure among a large sample of Indian adolescents that assesses the impact of body image concerns on life disengagement. The BILD-Q demonstrates satisfactory psychometric properties in terms of reliability and a strong one-factor structure. However, the limitations of the present study must also be considered. First, this measure was tested among adolescents living in urban Delhi and attending affluent private schools. Therefore, the findings cannot be generalised to all adolescents across India, as adolescents in public and

private schools in urban parts of India have varied experiences (Satija et al., 2018). Further, more than 60% of India's population live in rural areas, where adolescents speak several languages, other than English. Therefore, this measure needs to be further adapted to facilitate accessibility to adolescents in other parts of India and who do not speak English. Accordingly, the authors are in the process of validating the BILD-Q for use in Hindi. Another limitation concerns the selected method for testing measurement invariance, the MIMIC model. While it was chosen for its capability to adjust for age, it assumes equivalence of factor loadings across groups, adjusted for age. Further, we have argued that the effect sizes of the direct effects of gender (adjusted for age) were small, and thus, the measurement non-invariance found in our study was negligible. At the time of this research, there were no standardised (in categorical data) and widely used criteria for formally judging the magnitude of the effect sizes, although some recent results have been published (Nye & Drasgow, 2011; Gunn et al., 2020). We also acknowledge that different scholars have different opinions of the importance of measurement invariance per se (Leitgöb et al., 2023). However, we believe that it is important for research to report on their findings in relation to measurement invariance and explain their rationale on their conclusions on the comparability of the scores. Further, the BILD-Q refers to "*worries or feeling bad about the way you looked*", i.e., concerns about appearance more broadly, as opposed to specific aspects of appearance. Future research might consider examining the impact of specific body image concerns in India among adolescents, given the prevalence of dissatisfaction relating to skin colour, body hair, and height (Phadke, 2017; Satija et al., 2018). Finally, due to the broad absence of validated psychological scales among Indian adolescents, it was challenging to find any psychometrically sound measures to enable the assessment of the discriminant validity of this measure. This is an important avenue of exploration for future research.

Regarding the implications of this study, this research provides a reliable measure to assess the impact of body image concerns on adolescents in urban India. There is currently limited understanding of how mental health and body image impacts Indian adolescents' behaviours, disengagement, and life satisfaction (Raval et al., 2018). Therefore, it is anticipated that the BILD-Q will facilitate such research, as this will complement the growing literature on the prevalence and nature of body image concerns among Indian adolescents. In addition to researchers, the BILD-Q can also be used by health professionals to understand the extent of the impact of body image concerns; and to inform when interventions are warranted.

5. Conclusion

In conclusion, this study validated a single-factor structure of the BILD-Q consisting of 9 items, among urban Indian adolescents, that can be used comparatively across girls and boys without gender bias. The BILD-Q is unique measure that can be used to assess the impact of body image concerns on life disengagement among adolescents in urban India, which has so far been absent in the literature. This will facilitate further research to better understand body image among this group, and thus develop better support to prevent poor mental health among adolescents in India.

CRediT authorship contribution statement

Lewis-Smith Helena: Writing – review & editing, Visualization, Supervision, Resources, Project administration, Methodology, Funding acquisition, Conceptualization. **Garbett Kirsty M.:** Writing – review & editing, Visualization, Resources, Project administration, Methodology, Data curation. **Hasan Farheen:** Writing – original draft, Resources, Project administration, Data curation. **Vitoratou Silia:** Writing – review & editing, Formal analysis. **Uglik-Marucha Eleanora:** Writing – review & editing, Formal analysis. **Shroff Hemal:** Writing – review & editing, Resources, Methodology. **Dhillon Megha:** Writing – review & editing, Resources, Methodology. **Diedrichs Phillippa C.:** Writing – review & editing, Visualization, Supervision, Methodology, Funding acquisition, Conceptualization. **Ahuja Latika:** Writing – review & editing, Resources, Project administration, Data curation. **Chaudhry Anshula:** Writing – review & editing, Resources, Project administration, Data curation.

Declaration of Competing Interest

HLS and PD are independent consultants to the Dove Self-Esteem Project, and PD was on the Dove Self-Esteem Project Global Advisory Board from 2013 to 2016. The authors declare that they have no competing interests. The funders had no role in data analysis, decision to publish, or manuscript preparation. The Dove Self-Esteem Project (Unilever) were permitted to review the manuscript and suggest changes, but the authors exclusively retained the final decision on content. The views expressed are those of the authors and not necessarily those of Unilever, the NHS, the NIHR or the Department of Health and Social Care.

Data availability

Data will be made available on request.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.bodyim.2023.101673.

References

Agnihotri, Awasthi, S., Chandra, H., Singh, U., & Thakur, S. (2010). Validation of WHO QOL-BREF instrument in Indian adolescents. *Indian Journal of Paediatrics, 77*(4), 381–386. https://doi.org/10.1007/s12098-010-0041-1

Akosah-Twumasi, P., Emeto, T. I., Lindsay, D., Tsey, K., & Malau-Aduli, B. S. (2018). A systematic review of factors that influence youths career choices—the role of culture. *Frontiers in Education, 3.* https://doi.org/10.3389/feduc.2018.00058

Anastasi, A., & Urbina, S. (1997). *Psychological Testing* (7th ed.). Prentice Hall: Pearson Education,.

Antaramian, S., Kamble, S. V., & Huebner, E. S. (2016). Life satisfaction and coping in Hindu adolescents in India. *Journal of Happiness Studies, 17*(4), 1703–1717. https://doi.org/10.1007/s10902-015-9666-0

Atkinson, M. J., & Diedrichs, P. C. (2021). Assessing the impact of body image concerns on functioning across life domains: Development and validation of the Body Image Life Disengagement Questionnaire (BILD-Q) among British adolescents. *Body Image, 37*, 63–73. https://doi.org/10.1016/j.bodyim.2021.01.009

Baby, B. M., Eldho, D., & Balakrishnan, K. (2021). Growing body dissatisfaction among woman: A study of the movie "I feel pretty.". *Journal of Xi'an Shiyou University Natural Science Edition, 17*(6), 218–223.

Bartlett, M. S. (1951). The effect of standardization on a χ2 approximation in factor analysis. *Biometrika, 38*(3–4), 337–344. https://doi.org/10.1093/biomet/38.3-4.337

Bennett, D. A. (2001). How can I deal with missing data in my study? *Australian and New Zealand Journal of Public Health, 25*(5), 464–469. https://doi.org/10.1111/j.1467-842X.2001.tb00294.x

Bohn, K., Doll, H. A., Cooper, Z., O'Connor, M., Palmer, R. L., & Fairburn, C. G. (2008). The measurement of impairment due to eating disorder psychopathology. *Behavior Research and Therapy, 46*(10), 1105–1110. https://doi.org/10.1016/j.brat.2008.06.012

Bornioli, Lewis-Smith, H., Smith, A., Slater, A., & Bray, I. (2019). Adolescent body dissatisfaction and disordered eating: Predictors of later risky health behaviors. *Social Science & Medicine.* https://doi.org/10.1016/j.socscimed.2019.112458

Bowker, J. C., & Raja, R. (2011). Social withdrawal subtypes during early adolescence in India. *Journal of Abnormal Child Psychology, 39*(2), 201–212. https://doi.org/10.1007/s10802-010-9461-7

Brown, T.A. , (2015). Confirmatory factor analysis for applied research. Second Edition. The Guilford Press.

Cangur, S., & Ercan, I. (2015). Comparison of model fit indices used in structural equation modeling under multivariate normality. *Journal of Modern Applied Statistical Methods, 14*(1), 152–167. https://doi.org/10.22237/jmasm/1430453580

Cash, T. F., & Fleming, E. C. (2002). The impact of body image experiences: Development of the body image quality of life inventory. *The International Journal of Eating Disorders, 31*(4), 455–460. https://doi.org/10.1002/eat.10033

Cash, T. F., Santos, M. T., & Williams, E. F. (2005). Coping with body-image threats and challenges: Validation of the body image coping strategies. *Inventory Journal of Psychosomatic Research, 58*(2), 190–199. https://doi.org/10.1016/j.jpsychores.2004.07.008

Cattell, R. B. (1966). The scree test for the number of factors. *Multivariate Behavioral Research, 1*(2), 245–276. https://doi.org/10.1207/s15327906mbr0102_10

Chandra, P. S., Abbas, S., & Palmer, R. (2012). Are eating disorders a significant clinical issue in urban India? A survey among psychiatrists in Bangalore. *International Journal of Eating Disorders, 45*(3), 443–446. https://doi.org/10.1002/eat.20952

Cordon, S. L., & Finney, S. J. (2006). Measurement invariance of the mindful attention awareness scale across adult attachment style. *Measurement & Evaluation in Counseling & Development, 40*(4), 228–245. https://doi.org/10.1080/07481756.2008.11909817

R. Core Team , (2020). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL ⟨https://www.R-project.org/⟩.

Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*, 297–334. https://doi.org/10.1007/BF02310555

Davidov, E., Meuleman, B., Cieciuch, J., Schmidt, P., & Billiet, J. (2014). Measurement equivalence in cross-national research. *Annual Review of Sociology, 40*(1), 55–75. https://doi.org/10.1146/annurev-soc-071913-043137

Deb, S., Strodl, E., & Sun, H. (2015). Academic stress, parental pressure, anxiety and mental health among Indian high school students. *International Journal of Psychology and Behavioral Science, 5*(1), 26–34. https://doi.org/10.5923/j.ijpbs.20150501.04

Deshmukh, V. R., & Kulkarni, A. A. (2017). Body image and its relation with body mass index among Indian adolescents. *Indian Pediatrics, 54*(12), 1025–1028. https://doi.org/10.1007/s13312-017-1205-0

Dhillon, M., & Dhawan, P. (2011). But I am fat": The experiences of weight dissatisfaction in Indian adolescent girls and young women. *Women's Studies International Forum, 34*, 539–549. https://doi.org/10.1016/j.wsif.2011.08.005

Dove, (2017). The 2017 Dove Global Girls Beauty and Confidence Report. Unilever and Edelman Intelligence.

Dye, H. (2016). Are there differences in gender, race, and age regarding body dissatisfaction? *Journal of Human Behavior in the Social Environment, 26*(6), 499–508. https://doi.org/10.1080/10911359.2015.1091240

Ebesutani, C., Regan, J., Smith, A., Reise, S., Higa-McMillan, C., & Chorpita, B. F. (2012). The 10-item positive and negative affect schedule for children, child and parent shortened versions: Application of item response theory for more efficient assessment. *Journal of Psychopathology and Behavioral Assessment, 34*(2), 191–203. https://doi.org/10.1007/s10862-011-9273-2

Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview or self-report questionnaire? *International Journal of Eating Disorders, 16*(4), 363–370. https://doi.org/10.1002/1098-108X (199412)16:4%3C363::AID-EAT2260160405%3E3.0.CO;2-%23

Ganesan, Ravishankar, S., & Ramalingam, S. (2018). Are body image issues affecting our adolescents? A cross-sectional study among college going adolescent girls. *Indian Journal of Community Medicine, 43*(5), 42–46. https://doi.org/10.4103/ijcm.IJCM_62_18

Garbett, K. M., Lewis-Smith, H., Chaudhry, A., Uglik-Marucha, N., Vitoratou, S., Shroff, H., … Diedrichs, P. C. (2021). Cultural adaptation and validation of the Body Esteem Scale for Adults and Adolescents for use in English among adolescents in urban India. *Body Image, 37*, 246–254. https://doi.org/10.1016/j.bodyim.2021.02.012

Gupta, M. A., Chaturvedi, S. K., Chandarana, P. C., & Johnson, A. M. (2001). Weight-related body image concerns among 18–24-year-old women in Canada and India: An empirical comparative study. *Journal of Psychosomatic Research, 50*(4), 193–198. https://doi.org/10.1016/S0022-3999(00)00221-X

Guttman, L. (1954). Some necessary conditions for common factor analysis. *Psychometrika, 19*, 149–161.

Halliwell, E., Diedrichs, P.C., & Orbach, S. , (2014). Costing the invisible: A review of the evidence examining the links between body image, aspirations, education and workplace confidence. ⟨http://eprints.uwe.ac.uk/24438/⟩.

Hedaoo, R., & Gavaravarapu, S. M. (2020). Understanding body image perception and body image discontentment in early adolescence. *Indian Journal of Community Health, 32*(2), 411–417. https://doi.org/10.47203/IJCH.2020.v32i02.019

Horn, L. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika, 30*(2), 179–185. https://doi.org/10.1007/bf02289447

Hu, L., & Bentler, P. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*, 1–55. https://doi.org/10.1080/10705519909540118

IBM Corp , (2017). IBM SPSS Statistics for Windows (Version 25.0) [Computer software]. IBM Corp.

Jain, P., & Tiwari, G. K. (2016). Positive body image and general health: A mixed methods study. *The International Journal of Indian Psychology, 4*(1), 33–51, 18.01.003/20160476.

Johnson, A. R., Balasubramanya, B., & Britto, R. D. (2015). Body image perception and nutritional status of adolescents in a school in rural South India. *Journal of Indian Association for Child & Adolescent Mental Health, 11*, 260–278.

Jöreskog, K. G., & Goldberger, A. S. (1975). Estimation of a model with multiple indicators and multiple causes of a single latent variable. *Journal of the American statistical Association, 70*(351a), 631–639.

Kaiser, H. F. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20*, 141–151. https://doi.org/10.1177/001316446002000116

Kaiser, H. F., & Rice, J. (1974). Little Jiffy, Mark Iv. *Educational and Psychological Measurement, 34*(1), 111–117. https://doi.org/10.1177/001316447403400115

Kline, R. B. (2016). *Principles and Practice of Structural Equation Modeling* (3rd ed.). New York, NY: The Guilford Press,.

Koch, G.G. , (1982). Intraclass correlation coefficient. In Samuel Kotz and Norman L. Johnson (Eds.). Encyclopaedia of Statistical Sciences 4. New York: John Wiley. pp. 213–217. https://doi.org/10.1002/9781118445112.stat02461.

Kyriazos, T., & Poga-Kyriazou, M. (2023). Applied psychometrics: Estimator considerations in commonly encountered conditions in CFA, SEM, and EFA practice. *Psychology, 14*(5), 799–828. https://doi.org/10.4236/psych.2023.145043

Landis, J., & Koch, G. (1977). The measurement of observer agreement for categorical data. *Biometrics, 33*(1), 159. https://doi.org/10.2307/2529310

Leitgöb, H., Seddig, D., Asparouhov, T., Behr, D., Davidov, E., De Roover, K., Jak, S., Meitinger, K., Menold, N., Muthén, B., Rudnev, M., Schmidt, P., & van de Schoot, R. (2023). Measurement invariance in the social sciences: Historical development, methodological challenges, state of the art, and future perspectives. *Social Science Research, 110*, Article 102805. https://doi.org/10.1016/j.ssresearch.2022.102805

Lewis-Smith, H., Bray, I., Salmon, D., & Slater, A. (2020). Prospective pathways to depressive symptoms and disordered eating in adolescence: A 7-year longitudinal cohort study. *Journal of Youth and Adolescence, 49*, 2060–2074. https://doi.org/10.1007/s10964-020-01291-1

Lewis-Smith, H., Garbett, K. M., Chaudhry, A., Uglik-Marucha, N., Vitoratou, S., Dhillon, M., Shroff, H., & Diedrichs, P. C. (2021b). Adaptation and validation of the internalisation-general subscale of the sociocultural attitudes towards appearance questionnaire (SATAQ-3) in English among urban Indian adolescents. *Body Image, 36*, 254–262. https://doi.org/10.1016/j.bodyim.2020.12.004

Lewis-Smith, H., Garbett, K. M., Chaudhry, A., Uglik-Marucha, N., Vitoratou, S., Dhillon, M., & Diedrichs, P. C. (2021a). Adaptation and validation of the eating disorder examination-questionnaire in english among urban Indian adolescents. *International Journal of Eating Disorders, 54*(2), 187–202. https://doi.org/10.1002/eat.23431

Maezono, J., Hamada, S., Sillanmäki, L., Kaneko, H., Ogura, M., Lempinen, L., & Sourander, A. (2019). Cross-cultural, population-based study on adolescent body image and eating distress in Japan and Finland. *Scandinavian Journal of Psychology, 60*(1), 67–76. https://doi.org/10.1111/sjop.12485

McDonald, R. P. (1999). *Test Theory: A Unified Treatment.* Lawrence Erlbaum Associates Publishers,.

Mehra, Lakiang, T., Kathuria, N., Kumar, M., Mehra, S., & Sharma, S. (2022). Mental health interventions among adolescents in India: A scoping review. *Healthcare, 10* (2), 337. https://doi.org/10.3390/healthcare10020337

Menon, M., & Pant, P. (2015). Are contingencies of self-worth associated with body image in Indian and British women? *Psychological Studies, 60*, 129–137. https://doi.org/10.1007/s12646-014-0296-0

Millsap, R. E. (2011). *Statistical Approaches to Measurement Invariance* (1st ed.). New York, NY: Routledge,.

Moehlecke, M., Blume, C. A., Cureau, F. V., Kieling, C., & Schaan, B. D. (2020). Self-perceived body image, dissatisfaction with body weight and nutritional status of Brazilian adolescents: a nationwide study. *Jornal Délelõtt Pediatria, 96*, 76–83. https://doi.org/10.1016/j.jpedp.2018.11.009

Mohanty, A.K., & Panda, M. , (2017). Language policy and education in the Indian subcontinent. In T. McCarty & S. May (Eds.), Encyclopaedia of language and education. Springer International Publishing.

Muthén, B. (1979). A structural probit model with latent variables. *Journal of the American Statistical Association, 74*, 807–811. https://doi.org/10.2307/2286403

Muthén B., du Toit, S.H.C., Spisic, D. , (1997). Robust inference using weighted least squares and quadratic estimating equations in latent variable modelling with categorical and continuous outcomes. Unpublished technical report.

Muthén, L.K. & Muthén, B.O. , (1998–2017). Mplus User's Guide. Eighth Edition.

Nagle, Y. K., & Sharma, U. (2018). Academic stress and coping mechanism among students: An Indian perspective. *Journal of Child Adolescence Psychology, 2*(1), 6–8.

Neumark-Sztainer, D., Paxton, S. J., Hannan, P. J., Haines, J., & Story, M. (2006). Does body satisfaction matter? Five-year longitudinal associations between body satisfaction and health behaviors in adolescent females and males. *Journal of Adolescent Health, 39*(2), 244–251. https://doi.org/10.1016/j.jadohealth.2005.12.001

Nye, C. D., & Drasgow, F. (2011). Effect size indices for analyses of measurement equivalence: Understanding the practical importance of differences between groups. *Journal of Applied Psychology, 96*(5), 966–980. https://doi.org/10.1037/a0022955

Pallant, J. , (2001), SPSS survival manual - a step by step guide to data analysis using SPSS for windows (version 10), Buckingham Open University Press.

Peltzer, K., Pengpid, S., & James, C. (2016). The globalization of whitening: Prevalence of skin lighteners (or bleachers) use and its social correlates among university students in 26 countries. *International Journal of Dermatology, 55*(2), 165–172. https://doi.org/10.1111/ijd.12860

Phadke, S. (2017). How to do feminist mothering in urban India? Some reflections on the politics of beauty and body shapes. *Aesthetic Labour: Rethinking Beauty Politics in Neoliberalism*, 247–261. https://doi.org/10.1057/978-1-137-47765-1_14

Polit, D. F. (2014). Getting serious about test–retest reliability: a critique of retest research and some recommendations. *Quality of Life Research, 23*, 1713–1720. https://doi.org/10.1007/s11136-014-0632-9

Presaghi F., Desimoni M. , (2019). random.polychor.pa: A Parallel Analysis with Polychoric Correlation Matrices. R package version 1.1.4–3.

Radwan, H., Hasan, H. A., Ismat, H., Hakim, H., Khalid, H., Al-Fityani, L., & Ayman, A. (2019). Body mass index perception, body image dissatisfaction and their relations with weight-related behaviors among university students. *International Journal of Environmental Research and Public Health, 16*(9), 1541. https://doi.org/10.3390/ijerph16091541

Raval, V. V., Ward, R. M., Raval, P. H., & Trivedi, S. S. (2018). Reports of adolescent emotion regulation and school engagement mediating the relation between parenting and adolescent functioning in India. *International Journal of Psychology, 53* (6), 439–448. https://doi.org/10.1002/ijop.12413

Rekha, V. S., & Maran, K. (2012). Advertisement pressure and its impact on body dissatisfaction and body image perception of women in India. *Global Media Journal: Indian Edition, 3*(1), 2249–5836.

Rosellini, A. J., & Brown, T. A. (2021). Developing and validating clinical questionnaires. *Annual Review of Clinical Psychology, 17*, 55–81. https://doi.org/10.1146/annurev-clinpsy-081219-115343

Rosenberg, M., (1965). Rosenberg self-esteem scale (RSE). Acceptance and Commitment Therapy. Measures Package, 61(52), 18. https://psycnet.apa.org/doi/10.1037/t01038–000.

Satija, A., Khandpur, N., Satija, S., Mathur Gaiha, S., Prabhakaran, D., Reddy, K. S., Arora, M., & Venkat Narayan, K. M. (2018). Physical activity among adolescents in India: A qualitative study of barriers and enablers. *Health Education & Behaviour, 45* (6), 926–934. https://doi.org/10.1177/1090198118778332

Schumacker, R. E., & Lomax, R. G. (2004). *A Beginner's Guide to Structural Equation Modeling* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates,.

Shagar, P. S., Donovan, C. L., Loxton, N., Boddy, J., & Harris, N. (2019). Is thin in everywhere?: A cross-cultural comparison of a subsection of the tripartite influence model in Australia and Malaysia. *Appetite, 134*, 59–68. https://doi.org/10.1016/j.appet.2018.12.025

Shroff, H., & Thompson, J. K. (2004). Body image and eating disturbance in India: Media and interpersonal influences. *The International Journal of Eating Disorders, 35*, 198–203. https://doi.org/10.1002/eat.10229Sihag

Singh, A. P., & Misra, G. (2016). Gender differences in lifestyle: Results of a survey among Indian school-going adolescents. *Social Change, 46*(3), 428–443. https://doi.org/10.1177/0049085716654816

Singh, M., Parsekar, S. S., & Bhumika, T. (2016). Body image, eating disorders and role of media among Indian adolescents. *Journal of Indian Association for Child & Adolescent Mental Health, 12*(1), 9–35. https://doi.org/10.1177/0973134220160102

Soohinda, G., Mishra, D., Sampath, H., & Dutta, S. (2019). Body dissatisfaction and its relation to Big Five personality factors and self-esteem in young adult college women in India. *Indian Journal of Psychiatry, 61*(4), 400–404. https://doi.org/10.4103/psychiatry.IndianJPsychiatry_367_18

Stigler, M. H., Arora, M., Dhavan, P., Shrivastav, R., Reddy, K. S., & Perry, C. L. (2011). Weight-related concerns and weight-control behaviours among overweight adolescents in Delhi, India: A cross-sectional study. *The International Journal of Behavioural Nutrition and Physical Activity, 8*(9). https://doi.org/10.1186/1479-5868-8-9

Streiner, D. L., Norman, G. R., & Cairney, J. (2015). *Health measurement scales: A practical guide to their development and use.* Oxford University Press,.

Swami, V., & Barron, D. (2019). Translation and validation of body image instruments: Challenges, good practice guidelines, and reporting recommendations for test adaptation. *Body Image, 31*, 204–220. https://doi.org/10.1016/j.bodyim.2018.08.014.

Swami, V., Frederick, D. A., Aavik, T., Alcalay, L., Allik, J., Anderson, D., & Cunningham, J. (2010). The attractive female body weight and female body dissatisfaction in 26 countries across 10 world regions: Results of the international body project I. *Personality and Social Psychology Bulletin, 36*(3), 309–325. https://doi.org/10.1177/0146167209359702

The Official Languages Act , (1963). Retrieved from ⟨https://rajbhasha.gov.in/en/official-languages-act-1963⟩.

Ullman, J.B. , (2001). Structural equation modeling. In B. G. Tabachnick & L. S. Fidell (2001). Using Multivariate Statistics (4th ed& pp 653- 771). Needham Heights, MA: Allyn & Bacon.

Vaidyanathan, S., Kuppili, P. P., & Menon, V. (2019). Eating disorders: An overview of Indian research. *Indian Journal of Psychological Medicine, 41*(4), 311–317. https://doi.org/10.4103/IJPSYM.IJPSYM_461_1

Van De Vijver, F. J. R., Davidov, E., Avvisati, F., Eid, M., van de Schoot, R., Fox, J. P., Lek, K. M., Meuleman, B., Paccagnella, M., & le Donné, N. (2019). Invariance analyses in large-scale studies. (OECD Education Working Papers). *OECD*. https://doi.org/10.1787/19939019

Vani, M. F., Pila, E., Willson, E., & Sabiston, C. M. (2020). Body-related embarrassment: The overlooked self-conscious emotion. *Body Image, 32*, 14–23. https://doi.org/10.1016/j.bodyim.2019.10.007

Waghachavare, V. B., Dhumale, G. B., & Kadam, J. H. (2021). Gender stereotyping among school-going female and male adolescents: A cross-sectional study in the rural area of Western Maharashtra, India. *Journal of Community Health Research, 10* (1). https://doi.org/10.18502/jchr.v10i1.5826

World Health Organization, (2012). World Health Organization Quality of Life: Measuring Quality of Life. Retrieved from: ⟨https://www.who.int/tools/whoqol⟩.

Wyse, A. E. (2021). How days between tests impacts alternate forms reliability in computerized adaptive tests. *Educational and Psychological Measurement, 81*(4), 644–667. https://doi.org/10.1177/0013164420979656

Zinbarg, R. E., Revelle, W., & Yovel, I. (2005). Cronbach's α, Revelle's β, and Mcdonald's ω *H*: their relations with each other and two alternative conceptualizations of reliability. *Psychometrika, 70*, 123–133. https://doi.org/10.1007/s11336-003-0974-7