Body image construct of Sri Lankan adolescents

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Abstract

Introduction "Body image" is more than the visual perception of size and it is probably multidimensional. It is known to influence eating behaviors and self-esteem of adolescents. Although widely studied in developed countries, it has been studied little in Sri Lanka.

Objectives This study was designed to translate and culturally adapt a tool to assess dimensions of body image in Sri Lankan adolescents.

Methods The study was carried out in the Anuradhapura District on school going children in grades nine to eleven. A multidimensional body image questionnaire was translated to Sinhalese language using the nominal group consensus method. The translated version was administered to 278 (114 boys) students after content validation and pre-testing. To assess test-retest reliability, the same questionnaire was administered to the same sample after two weeks. Psychometric properties were assessed using exploratory factor analysis.

Results Three-factor model emerged when dimensions in body image were analysed. Both boys and girls had almost identical factor structure. The three dimensions identified were "affective body image", "body perception" and "orientation on body size". All factors had good internal consistency with Cronbach's alpha > 0.76 and explained more than 56% of the total variance in both sexes.

Conclusions The translated body image questionnaire was a valid and reliable tool which can be used in Sri Lankan adolescents. Both genders had a similar, multidimensional body image construct.

Introduction

Body image is how an individual views his or her body, but it has a much deeper meaning than the visual perception of size. It is multidimensional and include perception, affect, cognition, attitudes, eating habits, weight reduction and body dissatisfaction [1-3].

Negative feelings and thoughts about one's body leads to unhealthy food habits, eating disorders, low self-esteem and depression [4-7]. Disturbance in body image is one of the diagnostic criteria of eating disorders [8]. Adolescents are more vulnerable to disorders related to negative body image as they undergo rapid physical and psychological changes [4]. In addition, the perception of body size is crucial in implementing weight management practices.

Majority of studies on body image have been carried out in high-income countries, mostly involving girls. Girls prefer a lean figure and are more dissatisfied about their body weight and body size than boys [9-11]. There is only limited data from the South Asian region on this topic. Studies carried out in high-income countries comparing attitudes about body image among Caucasians and Indo-Asians show wide variability [12-15]. Although young expatriate Indo-Asians prefer a thin body, traditional beliefs associate health with a larger body size [4,9].

In Sri Lanka, people generally tend to correlate plump figures with good health and a recent study shows that overweight adults consider themselves as being of normal size [16]. Whether adolescents prefer larger figures as their body ideal is not known. Because of exposure to global media, perception about ideal body image may be shifting towards a thinner body. Desire to be thin is a known factor for body dissatisfaction and eating disorders [4,17]. A study has reported eating disorders among Sri Lankan adolescent girls with body image distortion [18]. However, there is no validated tool to assess the body image in Sri Lankans and there are no data about their body image construct. Therefore, we translated and

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validated "body image questionnaire" (BIQ) to Sinhalese language to assess the body image dimensions of Sri Lankan adolescents in the Anuradhapura District. This tool was subsequently used in a larger epidemiological survey on obesity and body image among adolescents in Anuradhapura district.

Methods

The questionnaire

The multidimensional body image questionnaire (BIQ) was developed from ten questionnaires related to body image and comprises 28 questions answered on a 5 point Likert scale. Originally it included 134 questions categorized into four domains (perception, affect, cognition, behaviour) by twenty experts in the field of body image research [1]. This questionnaire had been developed to test the four-dimensional construct of body image; perception, cognition, affect and behavior. However, the original study revealed a three-factor model instead of four, as the most parsimonious to describe body image construct. These three factors were "cognition and affect regarding body", "body importance and dieting behavior" and "perceptual body image" [1].

This questionnaire itself has not been translated to other languages or used in other populations according to our knowledge. It contains items that measure different dimensions of body image, and we hypothesized this as the most suitable for measuring body image construct of our population.

Translation

The question with five silhouette figures was removed and a separate nine-silhouette figure rating scale was used in the larger epidemiological study [19]. Therefore, only 27 questions were translated. We used the nominal group consensus method for cultural adaptation and translation of this questionnaire [20].

Six medical graduates, fluent in both English and Sinhala, were enrolled as translators. Each one translated the questionnaire into Sinhala language separately. Prior to translation, they were briefed on the target population, questions, choices and the method of translation. They were introduced to consensus measurement and development using the modified Delphi technique [20]. There were six versions for each question.

The nominal group consisted of nine panelists including the six translators, two lecturers and a non-medical technical officer with the principal investigator (PI) acting as the facilitator. This stage consisted of five sessions panning over ten hours. Introducing the procedure and the rating system was repeated at the beginning of each session. The panel was requested to consider the target population, pragmatic meaning of the questions, cultural suitability and the appropriateness. This process consisted of three rounds for each question.

During the 1st round, the nine panelists ranked and rated the six Sinhalese translations independently. The results were tabulated and presented on PowerPoint to the nominal group for consensus measurement. Those achieving consensus rating as appropriate, were kept for the third round and inappropriate translations were discarded. Translations rated equivocal or disagreed upon, were presented to the second round for discussion. During the second round, translations were discussed, modified and rerated. Translations agreed upon as appropriate were presented at the third round where through individual, anonymous voting, most appropriate translation was selected [20].

Validation

Face and content validity:

The translated questionnaire was given to four lecturers of the Faculty of Medicine and Allied Sciences, Rajarata and three non-medical people to assess face validity. Four experts from fields of public health, medicine and nutrition assessed content validity.

Pretest:

Nine school students answered the questionnaire. This took about 10 minutes. After answering, they were asked to describe the difficulties in comprehending it and to rephrase each question in their own words. Depending on the feedback from pretest and content validation process, several changes were made to the questionnaire.

Construct validity:

There is no consensus in the literature as to the required sample size for factor analysis. It is generally recommended that for validation of a questionnaire, 4 - 10 subjects per variable should be included with minimum number of 100 subjects [21]. The translated questionnaire had 27 questions; hence calculated minimum sample size was 108 for each gender. Therefore, a total of 278 students (114 boys) between the ages of 13-16 years were included in the validation study. The epidemiological survey using this instrument was carried out in Anuradhapura, one of the districts in a predominantly rural North Central Province. There are five educational zones in this district and the students were selected from four schools in the Anuradhapura educational zone. These four schools were not in the sample frame of the larger epidemiological survey.

Ethics approval for the study was obtained from the Ethics Review Committee of the Faculty of Medicine and Allied Sciences, Rajarata University of Sri Lanka. Approval was obtained from the Provincial Education Department of North Central Province and Anuradhapura Zonal Education Department for data collection in schools. Principals of the selected schools were briefed

about the study and permission was obtained. Informed written consent was obtained from parents and students for participation as well as for possible publication of their anonymous data. Girls and boys were seated separately and they were asked not to discuss when answering the questionnaire. Prior to distribution of the questionnaire, the PI gave an introduction and instructions. Students were given the opportunity to clarify any doubts regarding the study or the individual questions, at any time during the procedure. The questionnaire was administered to the same participants after two weeks to assess the test-retest reliability.

Statistical analysis

Data were analysed using IBM SPSS version 20. Exploratory factor analysis (EFA) with maximum likelihood extraction method and oblique rotation was carried out along with Monte Carlo parallel analysis. Test-retest reliability was assessed with Spearman Rho. All analyses were segregated by gender.

Results

Face and content validity

The experts questioned the comprehensibility and cultural validity of two questions: "do you watch exactly what you eat" and "do you deliberately eat foods that are slimming" because in the Sri Lankan context the concept of 'slimming food' is not common and except for few food items, the nutrition content of food is not displayed. Other changes carried out include; changing the sequence of responses, replacing some responses with better translations and adding illustrations to clarify certain body parts. Two new questions were added which addressed the affective and perceptive domains of abdominal girth ('How do you feel about the appearance of your belly' and 'How would you describe the size of your belly? Is it smaller or larger than the average person'). This was done because experts felt that the belly is a major component of the body image perception among Sri Lankans. This perception is based on the predominance of visceral obesity among Indo-Asians [22,23].

During the pretest, students found these questions difficult to understand and were also queried by the content experts. Therefore, these two questions were removed from the questionnaire. The final Sinhala translation of BIQ included 27 questions including two new questions.

Psychometric validation

The 27 questions of the Sinhalese BIQ were subjected to exploratory factor analysis (EFA). Prior to EFA, the suitability of data for factor analysis was assessed by inspection of the correlation matrix. This revealed that except for one question in each gender, all others correlated with at least two other questions at or above the correlation coefficient of 0.3. The Kaiser-

Meyer-Olkin value was 0.75 for boys and 0.893 for girls exceeding the recommended value of 0.6 [24]. Bartlett's test of sphericity was significant for both boys and girls ($p < 0.000$) supporting the factorability of the correlation matrix.

EFA of data from boys

BIQ 7 was removed from factor analysis due to extreme skewness and BIQ 14 was removed due to its failure to significantly correlate with any other question. So, the EFA, conducted with 25 questions, revealed the presence of six factors with eigenvalue exceeding 1, explaining 22.7%, 18.0%, 7.8%, 6.7%, 4.8% and 4.6% of the variance. The criterion for factor loading was selected as 0.3. Using scree test, it was decided to retain three factors or four factors for further analysis [25]. Four factors were further supported by the results of parallel analysis by 'Monte Carlo principal component analysis for parallel analysis' software. This technique compares the size of the eigenvalues of current data set with those obtained from a randomly generated data set of the same size. Number of factors is determined by retaining only those factors whose eigenvalue exceeds the corresponding values from the random data set [24].

The four-factor solution explained a total of 56.06% of the variance. When the direct oblimin rotation (an oblique rotation) was performed to aid in the interpretation of these four factors, only two questions loaded in the third factor; namely BIQ 6 and BIQ 21. It is preferred that each factor should have at least three questions [26]. Therefore, the four-factor model was not acceptable.

Then, a three-factor solution was tested which explained 49.36% of the total variance. BIQ 20 and 21 failed to load in any of the pattern matrices with three, four and six factor extractions. Further, BIQ 20 was repeatedly recorded < 0.3 in communalities. Therefore, BIQ 20 and 21 were removed and factor analysis was repeated for three factors. The first two factors had good question loadings while three questions in the third factor also loaded in second factor. Internal consistency was analyzed using Cronbach's alpha. All three factors had a Cronbach's alpha > 0.76 which is above the recommended lower limit, showing good internal reliability. However, removal of BIQ 25 and BIQ 6 improved Cronbach's alpha of corresponding factors. Therefore, these two questions were removed from the questionnaire and EFA for three-factor model was repeated on the remaining 21 questions. A good factor loading could be seen after oblimin rotation with all the questions loading only in one factor except BIQ 13 and BIQ 16 (Table 1). This three factor solution with 21 questions, explained a total of 56.44% of the variance (first, second and third factors explaining 26.2%, 21.6% and 8.7% respectively).

The first factor included questions related to feelings about different body parts and was named

"affective body image". Its internal reliability was 0.913. The questions in the second factor were related to the perception of different body parts. Therefore, it was named as "body perception" and its reliability was 0.848. The third factor included questions, which describe how individuals think about the size and appearance of their body parts and their involvement in weight controlling behaviors. This factor was termed "orientation on body size" and its reliability was 0.817. Correlation between factors was very low; between factor one and two, -0.08; factor one and three -0.197; factor two and three, -0.036.

EFA of data from girls

BIQ 7 was removed from factor analysis due to extreme skewness and BIQ 20 was removed due to its failure to correlate with any other question at or above 0.3. The EFA, conducted with 25 questions, revealed the presence of four factors with eigenvalue exceeding 1, explaining a total variance of 61.97%. Using the scree test it was decided to retain three factors for further analysis and this was supported by the results of parallel analysis. The three-factor solution explained a total of 57.28% of the variance with each factor explaining more than 5% variance each.

Internal consistency was assessed with Cronbach's alpha. All factors had Cronbach's alpha >0.8 suggesting good reliability. Removal of BIQ 6, 13 and 25 increased Cronbach's alpha in corresponding factors. BIQ 6 and

BIQ 25 were repeatedly recorded as <0.3 in communalities. Therefore, EFA was repeated with remaining 22 questions leaving out BIQ 6, 7, 13, 20 and 25. Three factors were extracted (Table 2) which explained 61.0% total variance (37.1%, 16.0% and 8.0% by each factor respectively).

All the questions loaded exclusively in one factor. First factor was similar to the "body perception" factor found in boys, but included an additional question; "belly is too big". Internal reliability of the first factor was 0.889. Second factor was identical to the "affective body image" factor in boys and its reliability was 0.894. Third factor was similar to boys except in that, only five out of seven questions in the third factor were common to both genders. Internal consistency of this factor was 0.858. The correlation between factors was higher than in boys; between first and second, 0.23, between second and third factors 0.35 and between first and third factors, 0.52.

Test-retest reliability

Spearman Rho correlation was run for all 27 questions in the two data sets collected two weeks apart. All the questions correlated significantly in girls. Data from boys showed that three questions failed to show significant correlation. They were: BIQ 5 (describe buttocks), BIQ 14 (refuse food and drinks) and BIQ 20 (eat only vegetables, fruits and low calorie foods).

Table 1. Pattern matrix, variance and internal reliability in exploratory factor analysis with specified three factors for BIQ on adolescent boys in the Anuradhapura district, Sri Lanka

	Question	Factor		
		1 Affect	2 Perception	3 Orientation
BIQ 17	Feeling about waist	0.895		
BIQ 23	Feeling about body weight	0.844		
BIQ 24	Feeling about chest/breast	0.802		
BIQ 26	Feeling about body overall	0.795		
BIQ 15	Feeling about belly	0.721		
BIQ 8	Feeling about hip	0.653		
BIQ 11	Feeling about thighs	0.638		
BIQ 18	Describe thighs		0.71	
BIQ 5	Describe buttocks		0.682	
BIQ 2	Describe calf		0.674	
BIQ 9	Describe belly size		0.592	
BIQ 19	Describe hip		0.585	
BIQ 12	Describe biceps		0.507	
BIQ 16	Describe waist		0.445	-0.348
BIQ 4	Hip is too big			-0.733
BIQ 10	Feel fat			-0.716
BIQ 3	Skip meals to reduce weight			-0.641
BIQ 27	Fast for a day or more			-0.567
BIQ 22	Think about dieting			-0.526
BIQ 1	Belly is too big			-0.504
BIQ 13	Thighs too big	0.344		-0.457
Variance explained		26.20%	21.60%	8.70%
Reliability		0.92	0.85	0.82

Table 2. Pattern matrix, variance and internal reliability in exploratory factor analysis with specified three factors for BIQ on adolescent girls in the Anuradhapura district, Sri Lanka

	Question	*Factor*		
		1 Perception	*2 Affect*	*3 Orientation*
BIQ 5	Describe buttocks	0.836		
BIQ 9	Describe belly size	0.782		
BIQ 18	Describe thighs	0.779		
BIQ 16	Describe waist	0.773		
BIQ 12	Describe biceps	0.756		
BIQ 19	Describe hip	0.718		
BIQ 2	Describe calf	0.564		
BIQ 1	Belly is too big	0.479		
BIQ 17	Feeling about waist		0.821	
BIQ 26	Feeling about body overall		0.816	
BIQ 15	Feeling about belly		0.794	
BIQ 8	Feeling about hip		0.719	
BIQ 23	Feeling about body weight		0.708	
BIQ 24	Feeling about chest/breast		0.676	
BIQ 11	Feeling about thighs		0.632	
BIQ 3	Skip meals to reduce weight			0.796
BIQ 22	Think about dieting			0.709
BIQ 14	Refuse food & drinks			0.706
BIQ 27	Fast for a day or more			0.663
BIQ 4	Hip is too big			0.509
BIQ 10	Feel fat			0.491
BIQ 21	Exaggerate importance of weight			0.364
Variance explained		37.10%	16%	7.96%
Reliability		0.89	0.89	0.86

Discussion

In this study we translated and culturally adapted BIQ to Sri Lanka and validated it among adolescents. The initial validation of the questionnaire resulted in a Sinhalese version with 27 questions. Exploratory factor analysis of this questionnaire yielded a three-factor model for both boys and girls. These three domains were found to be "affective body image", "body perception" and "orientation on body size". The "affective body image" factor was responsible for the most of the variance seen in body image construct in boys (26.2%), while "body perception" seemed to be more important in girls (37.1%). In both genders, orientation on body size appears to be the least important in forming body image. This orientation factor seems to be influenced mainly by the below waist-body parts for boys while in girls, overall fatness appears to play the main role.

The three factor solution is supported by a previous study using the same questionnaire [1]. The "body perception" factor in the present study is consistent with the questions in the 'perceptual body image' in the above study. However in their study, which was carried out on adult females, cognitive and affective questions formed one common factor, "cognition and affect regarding body" while "affect" came up as one strong factor in the present study. This may favor the idea that there are cultural differences in formulating body image. The fact that these two studies were done in two different age groups (adolescents and adults) may have contributed to the above difference. The "orientation on body size" factor found in girls in the present study is consistent with the "body importance and dieting behavior" factor in the above study. However, in the present study, size of lower body parts appears to be the main influence on dieting behaviors of boys. One disadvantage in comparing present study with the previous one is that, the latter was done only in females. A study done on attitudinal aspects (cognition, affect and behavior) of body image not only showed the multi-dimensionality of body image, but also provided evidence to similarity of body image construct between males and females as seen in the present study [27]. In this study, an affective component emerged as a separate factor while cognitive and behavioral aspects could be converged to an "orientation factor" [27]. These results are quite similar to the present study. Another study done on adolescents using seven indices of body image disturbances which claim to measure cognitive, affective, behavioral and global dissatisfaction components had yielded only two factors [28]; a strong factor with perceptive and global dissatisfaction aspects and a weak factor with cognitive aspects. This finding is contradicted by the present study where two separate strong factors emerged for affective and perceptive aspects with a relatively strong factor for cognitive and behavioral aspects.

This study initiates a new field of research in Sri Lankan settings, of body image. This study shows that dimensions of body image are almost similar in both girls and boys. This similarity will permit the comparison between sexes. Although considered rare in Sri Lanka, a recent study has highlighted the occurrence of anorexia nervosa in Sri Lankan adolescents aged 13-15 years affecting both boys and girls equally [29]. However, these cases were diagnosed at a very later stage when they presented to the psychiatrist. If their body image distortion can be assessed earlier with a proper tool, it will be possible to detect those at risk of developing these disorders and intervene early to prevent its occurrence.

One major limitation of this tool is the lack of gender specificity. The original questionnaire was not developed to assess body image and eating disorders among females. Therefore, these questions do not address the aspects of muscularity and masculinity, both important cognitive dimensions in males, except the one on the size of biceps. Although this translated version of BIQ seems to be valid in boys, adding a separate section on muscularity could have improved the instrument when measuring body image construct in boys. In females, questions assessing muscularity may be inappropriate. Hence, using separate gender specific questions would overcome this problem. Cross validation and comparison with other instruments measuring aspects of body image such as 'body dissatisfaction scale' and 'body image avoidance questionnaire' will provide further evidence to the validity of Sinhala – BIQ to be used in Sri Lankan population.

Conclusions

This study shows that the translated BIQ is a valid, reliable and culturally appropriate tool to assess various components of body image in Sri Lankan Sinhala speaking adolescents and is easily administered to large number of participants. Body image construct of Sri Lankan adolescents can be considered three dimensional where both boys and girls show a similar three factor model. This knowledge on body image dimensions will be a useful guide for the future researchers to develop a tool to assess body image perception in our population.

Note: The Sinhala translation of the question-naire could be obtained from the corresponding author.

Acknowledgements

Conflicts of interests

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