



Confirmatory factor analysis of different versions of the Body Shape Questionnaire applied to Brazilian university students

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ABSTRACT

This study aimed at evaluating the validity, reliability, and factorial invariance of the complete (34-item) and shortened (8-item and 16-item) versions of the Body Shape Questionnaire (BSQ) when applied to Brazilian university students. A total of 739 female students with a mean age of 20.44 (standard deviation = 2.45) years participated. Confirmatory factor analysis was conducted to verify the degree to which the one-factor structure satisfies the proposal for the BSQ's expected structure. Two items of the 34-item version were excluded because they had factor weights (λ) < 40. All models had adequate convergent validity (average variance extracted = .43–.58; composite reliability = .85–.97) and internal consistency (α = .85–.97). The 8-item B version was considered the best shortened BSQ version (Akaike information criterion = 84.07, Bayes information criterion = 157.75, Browne–Cudeck criterion = 84.46), with strong invariance for independent samples ($\Delta\chi^2\lambda(7) = 5.06$, $\Delta\chi^2\text{Cov}(8) = 5.11$, $\Delta\chi^2\text{Res}(16) = 19.30$).

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Introduction

Body image is a construct directly related to the assessment and perception that individuals make about their own bodies (Sarwer & Cash, 2008; Tavares, Campana, Filho, & Campana, 2010). This concept entails the ability of individuals to create a mental representation of physical appearance. This representation is created through kinesthetic sensations and experiences lived by the individual throughout life. Furthermore, it involves emotions, behaviors, and beliefs associated with the self-perception of the body, and can manifest itself positively or negatively. According to Cash and Pruzinsky (2002), and Sarwer and Cash (2008), this representation can be directly influenced by the socio-cultural environment. This construct can be estimated by assessing specific aspects manifested through the perception of and/or attitudes toward one's body, among which we highlight the body shape concern, body weight, physical appearance, and muscle structure.

Body shape concern is one of the most studied self-image perceptions (Akdemir, Inandı, Akbas, Kahilogullari, Eren, & Canpolat, 2012; Conti, Cordás, & Latorre, 2009; Costa & Vasconcelos, 2010;

Di Pietro & Silveira, 2009; Evans & Dolan, 1993; Pimenta, Leal, Maroco, & Rosa, 2012) and refers to individual perceptions of body shape, which involves body appearance, size, and silhouette (Conti et al., 2009). This perception is strongly influenced by psychological, cognitive, and behavioral factors (Akdemir et al., 2012; Cash & Grasso, 2005) and can be experienced by individuals susceptible to developing mental and physiological changes related to physical appearance (Costa & Vasconcelos, 2010). Therefore, the body shape concern is an important factor that directly influences the daily lives of individuals (Cooper, Taylor, Cooper, & Fairburn, 1987).

The assessment of individuals' level of concern to body shape is essential to avoid health impairments, and this perception can be assessed using a psychometric scale, such as the commonly used Body Shape Questionnaire (BSQ; Cooper et al., 1987; Tavares et al., 2010).

The BSQ quantifies the level of satisfaction and concern of women toward their body shape (Akdemir et al., 2012; Miranda, Filgueiras, Neves, Teixeira, & Ferreira, 2012). This scale was initially created in English by Cooper et al. (1987), with a one-factor structure comprising 34 self-report items and using a 6-point Likert-type response scale. Subsequently, Evans and Dolan (1993) conducted a validation study and created six 8-item and 16-item versions, all of which had a unifactorial structure. In these versions, items were allocated using the mean score of the responses of 171 respondents,

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and had good values of internal consistency. Pook, Tuschen-Caffier, and Brähler (2008) and Warren et al. (2008) suggested that the shortened BSQ versions have more stable psychometric properties compared with the 34-item version when applied to German, American, and Spanish population samples.

At present, the BSQ has different versions (34-item and shortened versions) and is adapted for several countries, including Germany, Brazil, Colombia, Korea, United States, Spain, France, England, Japan, Malaysia, Mexico, Portugal, Sweden, and Turkey. However, there is no consensus in the literature regarding the use of the 34-item or shortened versions, and the factorial structure of the instrument in the different samples (Di Pietro & Silveira, 2009; Dowson & Henderson, 2001; Evans & Dolan, 1993). In general, previous studies have used the 34-item BSQ version and performed some adjustments to the instrument, such as decreasing the number of items and/or extracting factors, to adapt it to the study sample (Akdemir et al., 2012; Alcaraz, Caballero, Rodríguez, & Ayensa, 2007; Di Pietro & Silveira, 2009; Ghaderi & Scott, 2004; Moreno, Montaña, Prieto, & Pérez-Acosta, 2007; Rosalía et al., 2011; Rousseau, Knotter, Barbe, Raich, & Chabrol, 2005). These adjustments have been performed by resorting to exploratory factor analysis, which resulted in different factor structures of the instrument. Although these adjustments are commonly used, when the instrument has a solid theoretical conceptualization a priori, as is the case of the BSQ, the most appropriate strategy in the use of confirmatory analysis (Hair, Anderson, Tatham, & Black, 2009; Maroco, 2010) aims at preserving the theoretical structure of the construct.

In Brazil, the BSQ is one of the most widely used instruments to assess body shape concern; however, no previous study has used confirmatory analyses to verify the instrument's adequacy. Cordás and Castilho (1994) created the Brazilian version of the BSQ, and later Di Pietro and Silveira (2009) adapted it and conducted a validation study with university students. However, the analysis strategy used by the authors was exploratory, and resulted in a 4-factor structure. This structure has not been confirmed in the literature till date and, as emphasized earlier, this type of analysis strategy does not preserve the theoretical conceptualization of the BSQ, which is based on a unifactorial model. Furthermore, the exploratory analysis results in the extraction of random factors that follow data distribution but not necessarily the theoretical conceptualization of the instrument, and should thus be used with caution.

Therefore, the present study aimed to evaluate, for the first time, the metric qualities of the 34-item and shortened versions of the BSQ in a Brazilian sample, preserving the unifactorial structure proposed by Cooper et al. (1987) and Evans and Dolan (1993), and estimating the stability of these versions using independent samples. This evaluation is critical for assessing the quality of data collected with the BSQ. Accordingly, we aimed to describe the steps required to assess the validity and reliability of the instrument, while preserving the unifactorial proposals. Furthermore, we aimed to address the adequacy of these proposals in the evaluation of the construct in a Brazilian sample.

To achieve these goals, the following hypotheses were tested:

1. The complete (34-item) and shortened (16-item and 8-item) versions of the BSQ, when applied to Brazilian female university students, have adequate psychometric characteristics.
2. The factor structure of different BSQ versions is invariant for independent samples (test vs. validation).
3. The BSQ has an adequate concurrent validity when compared with the Weight Concerns Scale (WCS).
4. The BSQ has an adequate divergent validity when compared with the Maslach Burnout Inventory-Student Survey (MBI-SS).

Method

Participants

This cross-sectional and observational study used a non-probabilistic and convenience sample. Minimum sample size was estimated on the basis of the proposal made by Hair, Black, Babin, Anderson, and Tatham (2005) and Kim (2005), who reported that between 5 and 10 respondents per item (k) of the instrument are necessary for validation studies. We chose the maximum recommended of $10k$; therefore, considering that the BSQ has 34 items, the sample should have 340 participants. Moreover, because we assessed instrument stability, the use of a second sample with the same size ($n = 340$) was necessary. Accordingly, to perform all the validation stages proposed in the study, a minimum sample size of 680 participants was necessary. Considering a dropout rate of 15% (estimated from different epidemiological studies conducted with Brazilian university students by the authors), we adjusted this number to 800 subjects.

Female students ($n = 949$) at the Araraquara campus of the Universidade Estadual Paulista (UNESP), São Paulo, Brazil, were invited to participate. Only the students who voluntarily consented to complete the questionnaires were included in the study.

To characterize the sample, we collected information regarding the course enrollment year and area of study, and employment opportunities outside the university. The economic status was classified according to the guidelines established by the Brazilian Association of Market Research Institutes (ABEP, 2008).

We estimated the nutritional status of the participants by calculating the body mass index (in kg/m^2), using data on weight and height reported by the participants, and adopting the classification proposed by the World Health Organization (WHO, 2000) for students aged >20 years, and that proposed by Onis, Onyango, Borghi, Siyam, Nishida, and Siekmann (2007) for adolescents aged ≥ 10 to <20 years.

A total of 739 university students participated in the study (response rate = 77.87%), with a mean age of 20.44 (standard deviation = 2.45) years. Regarding the course enrollment year, 40.22% were in the first year of school, 25.95% in the second year, 21.47% in the third year, 10.46% in the fourth year, and 1.91% in the fifth year. Of these, 70.19% attended humanities-related courses, and 29.81% attended health science-related courses. Most students (70.14%) reported no employment outside the university. Regarding the economic level, 29.31% participants belonged to class A (average monthly income: \$3806.40–\$4882.40 USD), 52.78% belonged to class B (\$1129.58–\$2021.86 USD), 16.55% to class C (\$409.13–\$620.50 USD), and 1.36% to class D (\$289.20 USD). The average monthly income converted to Brazilian Reals (BRL) is as follows (exchange rate as of March 18, 2014): class A: \$8950.00–\$11,480.00 BRL, class B: \$2656.00–\$4754.00 BRL, class C: \$962.00–\$1459.00 BRL, and class D: \$680.00 BRL. Regarding the classification according to the nutritional status, 57.0% students were overweight/obese, 0.8% were malnourished, and 42.2% were eutrophic.

Considering all the completed questionnaires, 54 items (0.21%) were not answered (misses), and no questionnaire had more than 1 unfilled item. The imputation of missing data and the initial model fit were performed with the regression method and the maximum likelihood method, respectively, using the AMOS 20.0 software (SPSS Inc., Chicago, IL).

Instruments

To evaluate the body shape concern, we used the Portuguese version of the BSQ, adapted from the study by Di Pietro and Silveira (2009). Di Pietro and Silveira (2009) found an adequate internal

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