Validity and Reliability of the Brazilian Version of the Weight Control Behaviors Scale

Karin Louise Lenz Dunker, PhD, and Angelica Medeiros Claudino, PhD

Objective To develop and validate the weight-control behaviors (WCBs) scale and to evaluate its psychometric properties.

Study design We made use of data from a cluster-randomized trial assessing the effectiveness of the Brazilian New Moves Program. The Brazilian New Moves Program was a multicomponent intervention aimed at preventing weight-related problems among adolescent girls in public schools in São Paulo, Brazil.

Results Healthy and unhealthy WCBs were strongly associated. A 2-factor solution was the best model to explain the correlation across items, including following constructs: (1) healthy WCB: exercising, eating more fruits and vegetables, drinking less regular soda or sweetened drinks, eating fewer sweets, and paying attention to portion sizes; and (2) unhealthy WCB: skipping meals and the presence of any other, combined unhealthy weight-control behaviors, including fasting, eating little, going on a diet, vomiting, taking diet pills, using diuretics (water pills), using laxatives, using food substitutes (powder/special drinks), and smoking more cigarettes. The WCB scale was determined to be reliable (internally consistent) and valid, with high scores positively associated with body dissatisfaction and high body mass index values. Individual reliability values were high for factors representing healthy and unhealthy WCBs.

Conclusions Our findings support the use of the WCB scale as a screening tool for overall weight control behaviors among female adolescents. This assessment tool should be considered in future observational and experimental prospective studies. *(J Pediatr 2017;189:143-8).*

Trial registration Brazilian Registry of Clinical Trials: RBR-6ddpb3.

Over 70% of adolescent girls are currently striving to lose or control weight.[1-3] Healthy weight-control behaviors that include exercising, eating more fruits and vegetables, eating fewer sweets, drinking less sweetened drinks, and paying attention to portion sizes, constitute behaviors associated with psychosocial health and long-term weight maintenance among individuals who have successfully lost weight.[4,5] In contrast, unhealthy weight-control behaviors (WCBs) include dieting, fasting, vomiting, skipping meals, as well as using diuretics, laxatives, diet pills, meal replacements, or smoking cigarettes. Individuals performing unhealthy WCBs are at risk for multiple health problems, including body mass index (BMI) increase over time, eating disorders, depression, and suicidal ideation.[6-9] Both types of WCBs were previously described and measured in a number of studies.[10-12] However, there is a need for psychometrically evaluated assessment tools for healthy and unhealthy WCBs.[6,13,14]

Despite their consequences, as many as 75% of overweight adolescent girls practice unhealthy WCBs, as well as many within a healthy weight range.[1-4] These practices are appealing because they represent short-term solutions, unlike healthier methods requiring a lifelong discipline. Unhealthy WCBs may also be a drastic response to failures in previous attempts at weight loss.[4,7,10] There is an existing association between unhealthy WCBs with psychological distress, body dissatisfaction, and low self-esteem.[4,15]

Overall, there is a need to address WCBs within adolescent populations consistently. It is, therefore, necessary to develop straightforward and reliable instruments, allowing for the characterization of WCBs in different settings. Given the gap in the literature, the objective of this study was to develop and psychometrically evaluate the WCBs scale.

Methods

This study is an observational study aimed at developing a factor analysis examining the construct validity of the WCB scale and investigating the WCB's scale

BMI	Body mass index
BMI-P	BMI percentile
BSQ	Body Shape Questionnaire
df	Degrees of freedom
NPM	New Moves Program
RMSEA	Root mean square error of approximation
RSES	Rosenberg Self-Esteem Scale
WCBs	Weight-control behaviors

From the Department of Psychiatry, Federal University of São Paulo, São Paulo, Brazil

Supported by the São Paulo Research Foundation (FAPESP) [2012/16952-8] and by the Brazilian National Council for Scientific and Technological Development (CNPQ) [483871/2013-3]. The authors declare no conflicts of interest.

http://dx.doi.org10.1016/j.jpeds.2017.06.037

reliability and validity. We described our study in accordance with the Reporting of Observational Studies in Epidemiology statement.[16]

The Institutional Review Board of the Federal University of São Paulo, Brazil approved our study. Informed assent and consent forms were signed by adolescents and their parents/guardians, respectively, before the implementation of any study protocol. We registered the trial at the Brazilian Registry of Clinical Trials in September 2015 (RBR-6ddpb3).

Our study used data from a cluster-randomized trial evaluating the effectiveness of the Brazilian New Moves Program (NPM). The Brazilian NMP is a multicomponent intervention aimed at preventing weight-related problems among adolescent girls in public schools located in São Paulo, Brazil. The Brazilian program stemmed from the first NPM, previously designed and applied in the US.[17]

Eligible subjects were adolescent girls between 12 and 14 years of age, practicing less than 1 hour a day of physical activity at the time of study recruitment. Exclusion criteria were vomiting or taking laxatives with the intent of losing weight at least once a week. We performed the evaluation of these behaviors by use of structured questionnaires employed in the recruitment of potential participants.

The WCB scale was developed based on the questionnaires used in the first NPM. WCB scoring constituted of a sum of positive items including the following behaviors: (1) healthy WCBs: exercising, eating more fruits and vegetables, drinking less regular soda pop or sweetened drinks, eating fewer sweets, and paying attention to portion sizes; and (2) unhealthy WCBs: fasting, eating little, going on a diet, skipping meals, vomiting, taking diet pills, using diuretics (water pills), using laxatives, using food substitutes (powder/special drinks), and smoking more cigarettes. We determined if these behaviors occurred once a week during the previous month, directed at losing weight.

Before the Brazilian NPM, we conducted a pilot intervention with 25 girls meeting the inclusion criteria in a separate public school in the South region of São Paulo. This pilot occurred after approval by the Institutional Review Board and before the initiation of formal recruitment. During the initial pilot, some students demonstrated difficulty reading self-report questionnaires. Accordingly, questionnaires were read to them by the research staff at the time of evaluation, avoiding interpretation beyond the statement of each survey item.

Leme and Philippi[18] conducted the translation of the WCB questionnaire used in the American study from English to Brazilian Portuguese (**Table I**; available at www.jpeds.com). The questionnaire was cross-culturally adapted and translated in 4 stages: initial translation, back-translation, review by an expert committee, and cultural adaptation (**Appendix**; available at www.jpeds.com).

Participants had to mark each item as "yes" or "no." For better visualization, the WCB 8-item scale score was normalized to a 0-100 scale, with scores having a normal distribution. The normalization used a rescaling method aimed at improving interpretation.

For validation purposes, our study made use of the following structured questionnaires. (1) Body Shape Questionnaire (BSQ), a 34-item self-reported scale measured using Likert scale, with answers varying from 1-never; 2-rarely; 3-sometimes; 4-frequently; 5-very often; to 6-always. The scores were classified into following categories: ≤80 = no dissatisfaction; 81-110 = slight dissatisfaction; 111-140 = moderate dissatisfaction; and >141 = serious dissatisfaction.[19] (2) Rosenberg Self-Esteem Scale (RSES), a 10-item self-administered instrument that evaluates self-worth and feelings about the self. The items used a 4-point Likert categories ranging from strongly agree to disagree, with higher scores indicating higher self-esteem. Presenting versions adapted for adolescents, we cross-culturally validated the BSQ and RSES for the Brazilian language and population.[20,21] We also calculated BMI as weight (kg) divided by height squared (m), and used the following BMI percentile (BMI-P) classification: malnourished (BMI-P < P3); eutrophic (BMI-P = 3-85); overweight (BMI-P = 85-97), and obese (BMI-P > P97).[22]

Statistical Analyses

Our exploratory analysis started by evaluating distributions, frequencies, and percentages for each of the numeric and categorical variables. Categorical variables were assessed for near-zero variation.[23] Missing data were explored using a combination of graphical displays involving univariate, bivariate, and multivariate methods. Imputation was performed using a k-nearest neighbors algorithm (n = 5).[24] We obtained group comparisons through *t* tests and χ^2tests.

We used correlation matrices and plots as exploratory analysis tools to better understand the correlation across all items. Because items were numeric, ordinal, and logical, we used Pearson, polychoric, and polyserial correlation tests as appropriate. We also conducted a series of exploratory factor analyses using oblique and orthogonal rotations to explore different factorial solutions underlying the data, using maximum likelihood as the extraction method. Our heuristic for the selection of factor solutions included scree plots, solutions that were theoretically justifiable, and solutions where items loaded with values above 0.30 on a single factor while all other loadings were below that level.

We then used of a series of confirmatory factor models for each latent variable. All models were theoretically justified. Fit statistics for confirmatory factor analyses included fit function value, χ^2 value based on the fit function, degrees of freedom (df) for model, *P* value for obtained χ^2 value and df, χ^2 value for baseline model, df for baseline model, *P* value for the baseline model, logarithm of the likelihood statistic, logarithm of the likelihood statistic for baseline model, number of estimated measures in the model, total sample size, fit indexes (alphabetically organized), adjusted goodness-of-fit index, Akaike information criterion, Bayesian information criterion, Bayesian information criterion adjusted for sample size, comparative fit index, critical n for alpha = 0.05, critical n for alpha = 0.01, expected cross-validation index, goodness-of-fit index, incremental fit index, McDonald fit index, normed fit index, non-normed fit index, Parsimony goodness-of-fit index, Parsimony normed fit index, relative fit index, relative noncentrality index, root mean square error of approxima-