*Research Article*

# Validation of a Shortened Version of the Children's Eating Behavior Questionnaire and Associations with BMI in a Clinical Sample of Latino Children

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## ABSTRACT

**Objective:** To examine the validity of the Children's Eating Behavior Questionnaire (CEBQ) through the associations of its 3 subscale scores (food responsiveness, slowness in eating, and satiety responsiveness) with body mass index (BMI).

**Design:** Cross-sectional study of baseline data from a clinic-based obesity prevention and control randomized controlled trial.

**Participants:** Latino pediatric patients (n = 295) aged 5–11 years from a federally qualified health center in San Diego County, CA, with BMI percentiles ranging from 75.5 to 99.0.

**Main Outcome Measure:** Child BMI-for-age percentile computed using the standardized program for the 2000 Centers for Disease Control and Prevention growth charts.

**Analysis:** Principal components analysis and multivariate linear regressions.

**Results:** Principal components analysis showed a factor structure relatively similar to that of the original 3 CEBQ subscales, with acceptable internal consistency and between–subscale correlations. Analyses demonstrated the validity of the 3 subscales: child BMI was positively associated with food responsiveness ($\beta = .336$; $P \le .001$) and negatively associated with slowness in eating ($\beta = -.209$; $P \le .001$) and satiety responsiveness ($\beta = -.211$; $P \le .001$).

**Conclusions and Implications:** The 14-item CEBQ scale may be useful for assessing obesogenic eating behaviors of Latino children. Further study is needed to replicate these findings.

**Key Words:** validation study, eating behavior, Latino, children, body mass index (*J Nutr Educ Behav.* 2017;■■:■■–■■.)

Accepted August 30, 2017.

## INTRODUCTION

Overweight and obesity rates among Latino school-aged children in the US continue to rise. Recent estimates show a higher prevalence of obesity compared with non-Hispanic white children.[1] Children aged less than 11 years,[2] those who are of Mexican origin,[3] and those of low socioeconomic status[4,5] are disproportionately affected. These discrepancies highlight the importance of understanding the child behaviors that contribute to overweight and obesity in this high-risk population. Research into the behavioral risk factors for excessive weight in children found that specific eating behaviors are associated with overweight and obesity.[6,7] These behaviors were assessed through observational research, the use of psychometric tools, and parental report. However, there is a need to test and adapt existing instruments for populations at greater risk for pediatric obesity.

One of the most commonly used psychometric tools is the Children's Eating Behavior Questionnaire (CEBQ),[8] which studies used to examine associations among child eating behaviors, parent feeding practices,[9-11] and child weight.[12-14] Originally developed in the United Kingdom, the 35-item instrument uses parental report of children's usual eating behaviors to examine factors contributing to children's underweight and overweight.[15] The CEBQ assesses 8 dimensions of child eating that represent (1) food approach towards eating (ie, food approach): food

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responsiveness (FR), emotional over-eating, enjoyment of food, and desire to drink; and (2) avoidant-type responses to food (ie, food avoidance): satiety responsiveness (SR), slowness in eating (SE), emotional undereating, and food fussiness.

Food responsiveness, SR, and SE are 3 styles of eating behavior that were repeatedly associated with higher weight in children.[16] Food responsiveness concerns children's general appetite levels that could be viewed as maladaptive, such as preference for palatable foods and the tendency to eat when prompted by external cues.[15] Increased FR was found to be higher in obese children compared with those of normal-weight children.[13,17] Satiety responsiveness addresses the degree to which children respond to physiological cues of fullness or choose to stop eating based on perceived fullness.[15] A study comparing the eating behaviors of school-aged children across weight categories found that low SR was strongly related to increased adiposity.[18] Eating rate[19] is an additional indicator of SR, because it measures a decrease in the rate of consumption as a response to increased satiety.[7]

It appears that the CEBQ is a useful tool to measure children's eating behaviors; previous studies demonstrated its validity[8,15,20] and association with children's body mass index (BMI).[16,17] However, a limitation is that consistently successful validation of the CEBQ was limited to mostly European, English-speaking, non-Hispanic samples.[8,15,20] Studies using the CEBQ with diverse samples obtained mixed results. One validation study in a Portuguese sample of children aged 3–13 years found an underlying scale structure similar to that of the original CEBQ scale.[12] Another study of Chilean children aged 6–12 years found that although the original 8-factor structure of the CEBQ was not perfectly replicated in the sample, it retained good internal consistency.[14] A confirmatory factor analysis was also used to validate the CEBQ in an ethnically diverse, low-income sample of African American and Hispanic preschool children, but the study failed to replicate the *a priori* structure of the CEBQ.[21]

To the authors' knowledge, no study tested the CEBQ in a homogeneous sample of low-income Latino children. This study focused on validating 3 CEBQ subscales (FR, SE, and SR) as reported by parents of 5- to 10-year-old pediatric patients enrolled in an obesity prevention and control study. The authors examined the internal consistency of the CEBQ subscales as well as the associations between the CEBQ subscale scores and the children's BMI to determine the concurrent validity of the CEBQ subscales. Supported by previous evidence,[13,16-18] it was hypothesized that FR would be positively associated with child BMI and that both SR and SE would be negatively associated with child BMI.

## METHODS
### Overview of Procedures and Participants

The study used baseline data from the *Luces de Cambio* (*Luces*) study; a clinic-based obesity prevention and control randomized, controlled trial. Participants were pediatric patients of a federally qualified health center that provides services to low- and medium-income families living in the US–Mexico border community in San Diego, CA. Children who were identified as high-normal weight (≥75th percentile), overweight (≥85th percentile), and obese (≥95th percentile) were invited to participate in the study. The child's primary caregiver (biological parent or legal guardian) was also recruited for concurrent participation in the study and is referred to in this article as the parent. Final eligibility was determined during an in-person baseline assessment to verify the child's BMI status. Additional eligibility criteria for families included: (1) making at least 1 visit to the clinic within the previous 24 months, (2) self-identification as Latino, (3) ability to read Spanish or English, and (4) willingness to be randomized into 1 of the 2 experimental conditions (ie, study intervention or usual care). Exclusion criteria included children who were following a medically prescribed restricted diet; those with a condition that would limit the ability to be physically active or would affect growth or participation in the intervention; and those who had participated in other health education programs regarding overweight within the past year.

Parental consent and child assent were obtained for parents and children, respectively, before any study measurements were attained. Parents completed a pencil-and-paper questionnaire in their preferred language (English or Spanish). Questionnaires were completed individually or in groups with the guidance of a trained bilingual research assistant and included questions regarding demographic information (eg, income, educational attainment) and child health behaviors (eg, children's physical activity and eating behaviors). Research staff also measured children's height and weight using National Health and Nutrition Examination Survey Anthropometric Procedures.[22] This study was approved by the Institutional Review Board at San Diego State University.

### Measures

The CEBQ was designed to measure different styles of child eating. To minimize respondent burden on *Luces* study participants, the researchers decided *a priori* to use only 3 CEBQ subscales that were considered most relevant to the study's population and their risk for obesity risk[15]: FR (5 items), SR (5 items), and SE (4 items). The 14 items were translated into Mexican Spanish and back-translated into English by 3 bilingual members of the research team who were native Spanish speakers and fluent in the English language. According to established CEBQ protocols, parents rated each item on a 5-point Likert-type scale (1 = never to 5 = always), to indicate the frequency of the child's eating behavior. Scoring was reverse-coded for 2 CEBQ items so that higher scores reflected more frequent enactment of the child's eating behavior.[8]

Parent and child sociodemographic characteristics (age, education, country of birth, and length of residence in the US) were provided through parent's self-report. Child's BMI (kg/m$^2$) was calculated using height and weight measurements taken at baseline and was classified using child-specific Centers for Disease Control and Prevention weight categories.[23] Child's BMI-for-age percentile was computed using standardized SAS Program (version 9.2; SAS Institute Inc, Cary, NC) for the 2000 Centers for Disease Control and Prevention Growth Charts.[24]