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Confirmatory factor analysis of the Child Feeding Questionnaire among low-income African American families of preschool children

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Abstract

This study examined the factor structure for three of the Child Feeding Questionnaire (CFQ) subscales, a widely used measure of parental feeding practices, among 296 low-income parents of African American preschool children. Confirmatory factor analysis showed an overall poor fit among CFQ subscales; Restriction, Pressure to Eat, and Concern about Child Weight, (χ^2 , (df = 87) = 300.249, CFI = 1.00, NNFI = 1.07, RMSEA = .091). Additionally, Cronbach's Alpha coefficients for 2 of the three subscales were below acceptable recommendations (Restriction = 0.69; Pressure to Eat = 0.58). These results suggest further psychometric clarification is needed to understand commonly reported feeding practice constructs among low-income African American mothers of preschool aged children.

Keywords

Child Feeding Questionnaire; Feeding practices; Restriction; African American; Low-income; Validation

Introduction

For the past 3 decades, the prevalence of childhood overweight has significantly increased in the United States, with disproportionately more overweight children from minority populations (Hedley et al., 2004; Ogden, Flegal, Carroll, & Johnson, 2002). These differences in overweight prevalence by racial/ethnic group have also been identified from an early age (2–5 years) and have been shown to increase in magnitude as children become adolescents and young adults (Ogden et al., 2006). The observed trends in overweight prevalence imply that unique factors may contribute to the development of overweight

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among non-Hispanic white, African American, and other minority populations (Freedman, Khan, Serdula, Ogden, & Dietz, 2006). Understanding such factors related to childhood overweight therefore require the development of culturally valid instruments to further explore the discrepancy.

The role of parental feeding practices on children's development of self-regulation of energy intake is an important area to explore (Johnson & Birch, 1994; Savage, Fisher, & Birch, 2007), in which modifiable environmental factors can be identified as potential foci for overweight prevention and intervention programs. Questionnaires have most often been used to assess parenting strategies considered important in the development of childhood overweight (e.g., Excessive Control, Providing Rewards, and Pressure to Eat) (Birch et al., 2001; Wardle, Guthrie, Sanderson, & Rapoport, 2001). Faith and Kerns (2005) conducted a comprehensive literature review of the effects of parental feeding practices on childhood overweight and showed that parental feeding restriction, primarily using the revised Child Feeding Questionnaire (CFQ; Birch et al., 2001), was the only feeding domain to be associated with increased child energy intake and weight status.

Prior studies on parental feeding practices most often included participants who were well-educated, non-Hispanic white children from middle to high income families, limiting the generalizability of results (Birch, Fisher, & Davison, 2003; Blissett, Meyer, & Haycraft, 2006; Faith & Kerns, 2005). The original validation of the CFQ had included either 100% non-Hispanic White parents of girls ages 5–9 years and non-Hispanic White (85% of sample), African American (9%), and Hispanic (4%) families of children ages 7–11 years of age. Studies utilizing samples with minimal ethnic/cultural and economic diversity may help to explain why some investigations have failed to detect associations with parental feeding practices and child body mass index (BMI) (Robinson, Kiernan, Matheson, & Haydel, 2001; Saelens, Ernst, & Epstein, 2000), which notably included research with low-income, minority populations (Powers, Chamberlin, van Schaick, Sherman, & Whitaker, 2006). Moreover, interviews with low-income African American mothers of preschoolers (ages 2–5 years) showed that questionnaire items were sometimes interpreted differently than intended by researchers, including the following feeding practice items: using food to calm children, pushing the child to eat more, and difficulty in child feeding (Jain, Sherman, Chamberlin, & Whitaker, 2004). An important step in understanding these differences among parental feeding practices includes the development of culturally validated instruments in order to identify both important feeding strategies and those factors which may be culturally imbedded, which differ across ethnic groups (Baughcum et al., 2001; Faith & Kerns, 2005).

Recently, researchers have begun to explore the psychometric properties of previously validated instruments using more diverse populations. For instance, Anderson, Hughes, Fisher, and Nicklas (2005) examined the cross-cultural equivalence of parental feeding beliefs and practices with 101 African American and 130 Hispanic preschool children. A confirmatory factor analysis (CFA) of the CFQ demonstrated support for the factor structure although some cross-cultural conceptual problems were identified and problematic items were removed during subsequent model adjustments. In addition, a test of factorial invariance across ethnic groups showed adequate invariance of the factor structure. That is, members of different ethnic groups associated survey items with similar constructs.

Interestingly, the feeding domain to receive the most empirical support in prior studies, restriction, required five of the eight items to be removed as a result of nonsignificant factor loadings. The authors acknowledged that psychometric testing using larger samples will help provide additional support of these findings across ethnic groups.

Further establishing the psychometric properties of child feeding questionnaires remains key in further understanding cultural differences in the development of childhood overweight. The present study tested a portion of the CFQ factor structure, using the most commonly reported and significant scales from the CFQ with a large sample of low-income African American mothers of preschool children (Birch et al., 2003; Blissett et al., 2006; Faith & Kerns, 2005; Powers et al., 2006). Given the relatively limited psychometric validation of the CFQ with large minority samples, the purpose of the present study was to partially replicate the Anderson et al. (2005) study, with a large sample of low-income African American mothers of preschool aged children. Based on previous administrations of the CFQ involving minority populations, it was hypothesized that we would replicate the overall factor structure of the CFQ subscales with our larger sample.

Method

Participants

Participants in the study were 296 African American mothers of preschool children, 24–59 months of age, who were enrolled in the Cincinnati, Hamilton County, Ohio Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). WIC is a federal grant program which provides supplemental nutritious foods, nutrition education and counseling, and screening/referrals to other health, welfare, and social services to low-income, nutritionally at risk women and children up to age 5. Nutritionally at risk includes medically based (e.g., anemia) or dietary based (e.g., a poor diet). WIC eligibility income levels require applicants to earn no more than 185% of the Federal poverty level, equivalent to \$34,040 per year for a family of 4 at the time of this study (USDA website, accessed May 15, 2008).

Procedures

Sampling procedures have been previously reported elsewhere (Powers et al., 2006) and are briefly described here. Seven WIC clinics in Hamilton County, OH were chosen from a total of 17 clinics due to a majority of African American clients enrolled at these 7 locations. We note for the purposes of the present study that “mother” primarily includes the biological mother but may also include other primary female caregivers who brought the child to the WIC clinic, including grandmothers and other legal guardians.

At the time of registration for a clinic visit, mothers who identified as being African American were consecutively asked to participate in the study. Children with chronic medical conditions related to feeding or appetite (e.g., cerebral palsy) were excluded from the study, though none of the mothers approached for the study reported their children as having these conditions.

Initially, 307 eligible subjects were contacted for the study, in which 7 (2%) of these mothers decided not to participate, 1 mother was ultimately ineligible due to being less than 18 years of age, and 3 other participants had missing anthropometric data, resulting in a final sample of 296 participants.

Measures

Child Feeding Questionnaire-revised (Birch et al., 2001)—The Child Feeding Questionnaire is a 31-item self-report questionnaire measuring parental beliefs, attitudes, and practices in relation to child feeding. In the current study, 3 of the 7 scales were administered to parents, including Restriction, Pressure to Eat, and Concern for Child Weight (Table 1). These scales were chosen due to the most consistent empirical support relating these constructs to maternal or child weight, as well as the most often administered subscales (Faith & Kerns, 2005; Taveras et al., 2004). In addition, using only a portion of the CFQ maximized participation rates by limiting participant burden among a low-income, minority population which can be difficult to recruit.

Statistical analyses

Specification of CFA measurement model—A confirmatory factor analyses (CFA) was conducted to examine the factor structure of the CFQ in the current sample. Hypothesized CFA models were analyzed using maximum likelihood estimation in LISREL 8.80 (Jöreskog & Sörbom, 2004). A single-step model (CFA) using structural equation modeling was conducted on the entire sample in an attempt to replicate the factor structure found by Birch et al. (2001). Specifically, a three-factor measurement model was specified corresponding to the Concern about Child Weight, Pressure to Eat, and Restriction subscales based on items and not parcels, as suggested by (Little, Cunningham, Shahar, & Widaman, 2002). In addition, the model was established by allowing the latent factors (corresponding to the three subscales) to correlate freely.

Model fit indices—A variety of model fit indices were used to evaluate the fit of the hypothesized model to the current sample. A chi-square statistic indicates the overall model test fit, in which non-significance suggests the model fits the data. Because chi-square is particularly sensitive to sample size, other fit indices were examined including Bentler's comparative fit index (CFI), non-normed fit index (NNFI), and the root mean square error of approximation (RMSEA). Cut-off criterion values for indications of good model fit for CFI and NNFI were set at 0.95. A cut-off value of 0.06 was set for the RMSEA, an indicator which is sensitive to misspecified factor loadings (Hu & Bentler, 1998).

Results

Child and caregiver characteristics

The final sample included 296 mothers of children who were between the ages of 24 and 59 months at the time of data collection. The children included 142 boys (48%) and 154 girls, and the mean age was 3.37. The mean mother's age was 27.86 (SD = 7.67).

Subscale reliability

To assess the internal consistency of the *three* subscales, Cronbach's Alpha coefficients were calculated. The Concerns about Child Weight subscale demonstrated acceptable reliability ($\alpha = .81$), but the Pressure to Eat ($\alpha = .58$) and Restriction ($\alpha = .69$) subscales showed borderline internal consistency within this sample. The original validation study included only a sample of 9% African American and reported Cronbach's Alpha coefficients of .75, .70, and .73 for concerns about Child Weight, Pressure to Eat, and Restriction, respectively (Birch et al., 2001).

Confirmatory factor analysis

A confirmatory factor analysis (CFA) was conducted with Concern about Child Weight, Pressure to Eat, and Restriction subscales, allowing the three factors to correlate at the latent level. Model fit indices provided mixed results for the fit of the model within this sample, χ^2 , ($df = 87$) = 300.249, $p < .001$, CFI = 1.00, NNFI = 1.07, RMSEA = .091 (CI₉₀ = .080–.103), with CFI and NNFI values reflecting adequate fit but the RMSEA and chi-square suggesting poor fit (see Fig. 1). According to decision rules provided by Hu and Bentler (1998), the overall fit of the model in this sample was considered poor, indicating that the factor structure found in previous research was not replicated in the current sample. Examination of modification indices suggested that items on each subscale evidenced significant cross-loadings onto other subscales, contributing to model misfit. Specifically, items 1 and 2 on the Concerns about Child Weight subscale cross-loaded onto both the Restriction and Pressure to Eat subscales. Items 2 and 3 from the restriction subscale cross-loaded onto the Concerns about Child Weight subscale and item 6 from restriction cross-loaded on Pressure to Eat. Finally, item 3 from the Pressure to Eat subscale cross-loaded onto Concerns about Child Weight.

Discussion

The current study showed a poor factor structure fit when examining 3 scales of the Child Feeding Questionnaire among low-income African American mothers of preschool aged children. Our results indicate that additional conceptual clarification of feeding constructs is warranted based on the most commonly reported and significant CFQ subscales. Contrary to results reported by Anderson et al. (2005), our results suggest that additional significant factor modifications are necessary to specify a satisfactory model. Specifically, subscale Coefficient alpha scores were less than optimal (i.e., $< .70$; Nunnally, 1978) for two of the three assessed subscales (Restriction and Pressure to Eat). Furthermore, our data indicated “unacceptable” model fit even when using a more liberal RMSEA cut-off value of .08 or less as criterion for “reasonable fit”, as suggested by (Browne & Cudeck, 1993).

The present study employed a rigorous analytic approach by using individual items, rather than parcels of items, for the CFA. This analytic practice is considered the most common and appropriate method of factor structure validation by examining item performance versus parcel performance. The original validation study included item combinations of the 8 restriction items derived from principal component analysis (Birch et al., 2001). However, Anderson et al. (2005) showed that using item parcels can lead to potential misleading

model fit by hiding “poorly performing items” (p. 528). Although the practice of using item parcels may be considered appropriate in certain circumstances, such as modeling the effects of a factor at a specified level of generality by minimizing lower level *nuisance factors*, the practice raises significant threats to validity, including model misspecification, specifically, multidimensionality (Little et al., 2002).

The contributions of this study should be considered among our limitations. Our sample of families did not include other minority populations or comparison to Caucasian families. Our sample also included preschool aged children, which is younger than the original validation study. Additionally, we used only a portion of the CFQ, although factor structure would still be adequately tested if all items within each subscale are retained.

A major strength of the present psychometric validation study is the inclusion of a large sample of African American low-income mothers of preschool aged children regarding parental feeding practices. This population is of particular interest given both the prevalence of obesity and emerging evidence for the unique relationship between restrictive feeding practices and child weight status within this demographic group (Powers et al., 2006). Further, qualitative work with mothers from this population have found that mothers reported misunderstand feeding practice questionnaires (Jain et al., 2004). Thus, the present study highlights the necessity for further conceptual development of feeding practice questionnaires within populations known to be at increased risk for obesity.

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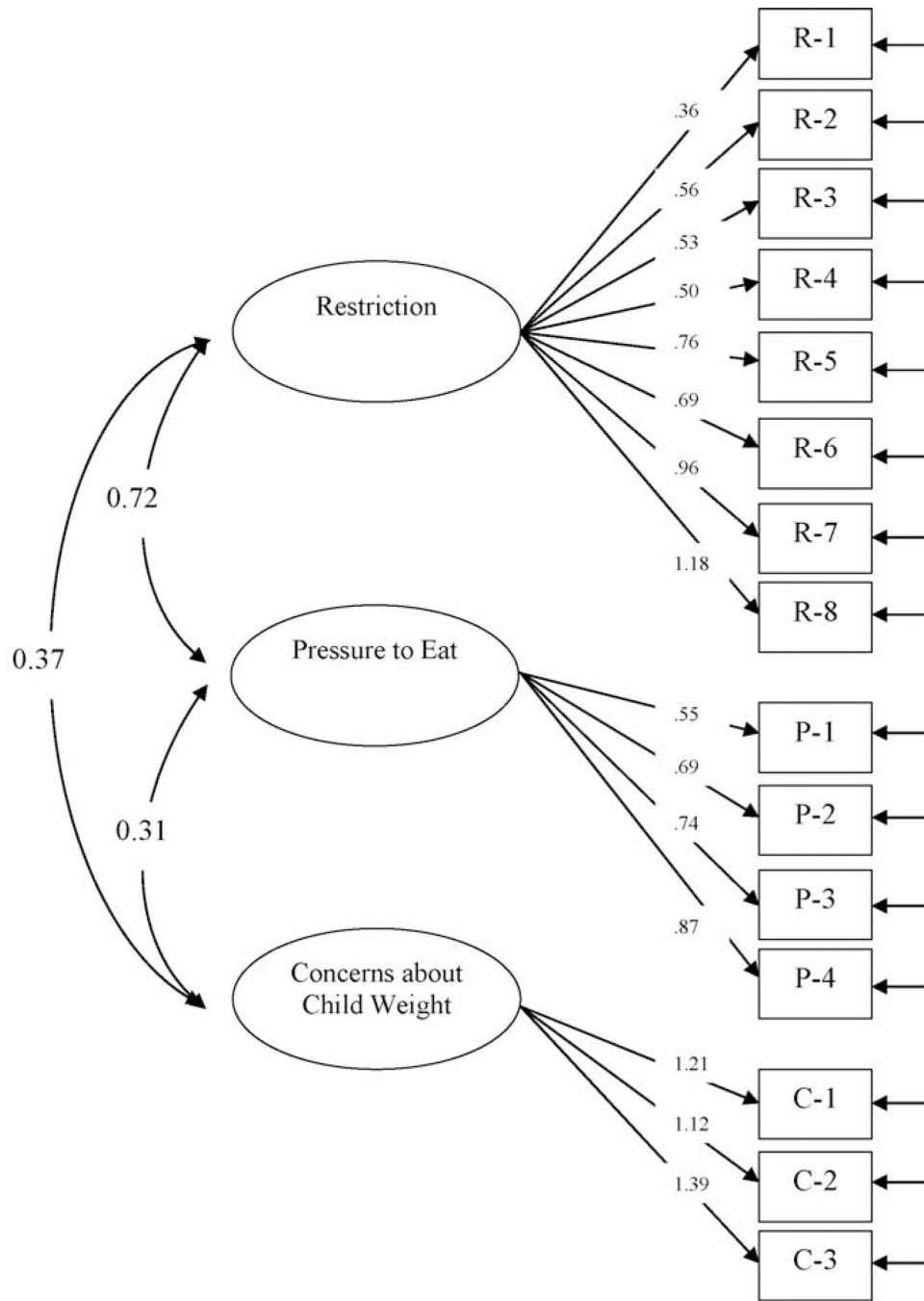


Figure 1. Measurement model of CFQ subscales within low-income African American mothers. *Note:* χ^2 , (df = 87) = 300.249, $p < .001$, CFI = 1.00, NNFI = 1.07, RMSEA = .091.

Table 1

Selected Child Feeding Questionnaire constructs.

Construct	Items
Restriction	<ol style="list-style-type: none"> 1. I have to be sure that my child does not eat too many sweets (candy, ice cream, cake, pastries) 2. I have to be sure that my child does not eat too many high fat foods 3. I have to be sure that my child does not eat too much of her favorite foods 4. I intentionally keep some foods out of my child's reach 5. I offer sweets (candy, ice cream, cake, pastries) to my child as a reward for good behavior 6. I offer my child her favorite foods in exchange for good behavior 7. If I did not guide or regulate my child's eating, she would eat too many junk foods 8. If I did not guide or regulate my child's eating, she would eat too much of her favorite foods
Pressure to Eat	<ol style="list-style-type: none"> 1. My child should always eat all of the food on her plate 2. I have to be especially careful to make sure my child eats enough 3. If my child says "I'm not hungry", I try to get her to eat anyway 4. If I did not guide or regulate my child's eating, she would eat much less than she should
Concern about Child's Weight	<ol style="list-style-type: none"> 1. How concerned are you about your child eating too much when you are not around him/her? 2. How concerned are you about your child having to diet to maintain a desirable weight? 3. How concerned are you about your child becoming overweight?