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Research report

Confirmatory factor analysis and measurement invariance of the Child Feeding Questionnaire in low-income Hispanic and African-American mothers with preschool-age children ☆

Angela Kong [a,b,*], Ganga Vijayasiri [a], Marian L. Fitzgibbon [a,c,d,e], Linda A. Schiffer [d], Richard T. Campbell [a,f]

[a] Institute of Health Research and Policy, University of Illinois at Chicago, Chicago, IL 60608, United States
[b] Department of Kinesiology and Nutrition, University of Illinois at Chicago, Chicago, IL 60608, United States
[c] University of Illinois Cancer Center, Chicago, IL 60612, United States
[d] Department of Medicine, College of Medicine, University of Illinois at Chicago, Chicago, IL 60612, United States
[e] Division of Health Policy and Administration, School of Public Health, University of Illinois at Chicago, Chicago, IL 60612, United States
[f] Division of Epidemiology and Biostatistics, School of Public Health, University of Illinois at Chicago, Chicago, IL 60612, United States

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ABSTRACT

Validation work of the Child Feeding Questionnaire (CFQ) in low-income minority samples suggests a need for further conceptual refinement of this instrument. Using confirmatory factor analysis, this study evaluated 5- and 6-factor models on a large sample of African-American and Hispanic mothers with preschool-age children (n = 962). The 5-factor model included: 'perceived responsibility', 'concern about child's weight', 'restriction', 'pressure to eat', and 'monitoring' and the 6-factor model also tested 'food as a reward'. Multi-group analysis assessed measurement invariance by race/ethnicity. In the 5-factor model, two low-loading items from 'restriction' and one low-variance item from 'perceived responsibility' were dropped to achieve fit. Only removal of the low-variance item was needed to achieve fit in the 6-factor model. Invariance analyses demonstrated differences in factor loadings. This finding suggests African-American and Hispanic mothers may vary in their interpretation of some CFQ items and use of cognitive interviews could enhance item interpretation. Our results also demonstrated that 'food as a reward' is a plausible construct among a low-income minority sample and adds to the evidence that this factor resonates conceptually with parents of preschoolers; however, further testing is needed to determine the validity of this factor with older age groups.

Introduction

Obesity rates among preschool-aged children (Centers for Disease Control and Prevention, 2013) have improved, but the prevalence of obesity (≥95th percentile) is still above 10% and 15% among African-American and Hispanic children (2–5 years), respectively (Ogden, Carroll, Kit, & Flegal, 2014). There is a continued need to understand more about modifiable obesity-related risk factors.

Factors that contribute to excessive weight gain during childhood are wide-ranging. The influential role of parents on child feeding habits and dietary intake is a particularly important factor (Anzman, Birch, & Rollins, 2010; Hurley, Cross, & Hughes, 2011; Vaughn, Tabak, Bryant, & Ward, 2013). A commonly administered measurement tool used to examine the relationship between parent feeding practices, children's dietary intake, and weight (de Lauzon-Guillain et al., 2012; Faith, Scanlon, Birch, Francis, & Sherry, 2004; Hurley et al., 2011) is the Child Feeding Questionnaire (CFQ) developed by Birch and colleagues (Birch et al., 2001). The CFQ is based on Costanzo and Woody's work on domain-specific parenting styles in children's obesity proneness (Costanzo & Woody, 1985) and consists of four factors that examine how a parent may elicit parental control in child feeding (i.e. Perceived Feeding Responsibility, Perceived Parent Overweight, Perceived Child Overweight, Concerns about Child Overweight) and three factors that assess dimensions of control in child feeding (i.e. restriction, monitoring, and pressure to eat) (Birch et al., 2001).

The development of the CFQ was largely based on non-Hispanic White families of middle to higher socioeconomic status (SES) with school-aged girls (Birch & Fisher, 2000; Birch et al., 2001). As a result, the factor structure of the CFQ has been extensively tested to examine the content validity of this instrument on a wide range of samples,

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* Corresponding author.
E-mail address: akong@uic.edu (A. Kong).

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varying by age, gender, socioeconomic status, and other factors (Anderson, Hughes, Fisher, & Nicklas, 2005; Boles et al., 2010; Corsini, Danthiir, Kettler, & Wilson, 2008; Geng et al., 2009; Kaur et al., 2006; Liu, Mallan, Mihrshahi, & Daniels, 2014; Nowicka, Sorjonen, Pietrobelli, Flodmark, & Faith, 2014).

Given the higher rates of obesity among low-income African American and Hispanic children, identifying measures that are reliable and valid for these at risk populations are of particular importance. Some validation work has been conducted among African-American and Hispanic parents with school-age and preschool-age children (Anderson et al., 2005; Birch et al., 2001; Boles et al., 2010). Initially, Birch et al. examined the factor structure of the CFQ on a small sample of Hispanic mothers with school-age children and two items from 'pressure to eat' (i.e. PE 25: "my child should always eat all of the food on her plate", PE 26: "I have to be especially careful to make sure my child eats enough"; see Appendix S1) and two items from 'restriction' [i.e. R21: "I offer sweets (candy, ice cream, cake, pastries) to my child as a reward for good behavior", R22: "I offer my child her favorite foods in exchange for good behavior"; see Appendix S1] were removed to produce acceptable fit (Birch et al., 2001). Later, Anderson et al. tested the CFQ on African-American (n = 101) and Hispanic parents with preschoolers (n = 130) and needed to remove two entire factors (i.e. 'perceived parent weight' and 'perceived child weight') and drop five low-loading items within the 'restriction' factor (i.e. R19, R20, R21, R22, R24; see Appendix S1) (Anderson et al., 2005) to fit their model. Similarly, Boles and colleagues administered three factors of the CFQ (i.e. restriction, pressure to eat, and concern about child weight) to African-American mothers with preschool-age children (n = 296) and were not able to replicate the factor structure within their sample (Boles et al., 2010). They attributed poor fit to factors significantly cross loading on other factors. These previous studies provide evidence that modifications to the CFQ may be required when administering this measurement tool to lower-income African American and Hispanic mothers.

To further strengthen this evidence base, we sought to replicate the factor structure for five CFQ factors on an even larger group of low-income African-American (n = 666) and Hispanic mothers (n = 296) with preschool-age children. Then, measurement invariance was tested to evaluate how well the two groups associated survey items within each CFQ factor. This can help to determine if the same trait is being measured across groups and thus allow for more meaningful comparisons between groups (Gregorich, 2006; Millsap & Kwok, 2004). Lastly, we tested a model that included "food as a reward" as one proposed solution for handling low loading items from the restriction factor (i.e. R21, R22; see Appendix S1) previously reported in many studies (Anderson et al., 2005; Birch et al., 2001; Corsini et al., 2008; Geng et al., 2009; Kaur et al., 2006; Nowicka et al., 2014). This idea was first introduced by Corsini et al. (2008) and has since been tested on two different Australia-based samples (Corsini et al., 2008; Liu et al., 2014); ours was the first study to do so in a US-based sample.

Methods

Participants

Mothers in this analytic sample were drawn from three different studies conducted in Chicago, Illinois. A description of each cohort is provided below.

A cohort of three hundred and sixty mothers (n = 171 Hispanic, n = 189 African-American) were in a longitudinal cohort study that assessed diet changes among low-income, African American and Hispanic mother–child dyads following the first 18 months of food package revisions enacted by the Special Supplemental Nutrition Program for Women, Infants, and Children program (WIC) in 2009 (Kong et al., 2013, 2014). Mother–child dyads were recruited for the longitudinal study from twelve different WIC clinics in Chicago, IL before implementation of WIC food package revisions. Parents with children between the ages of 2 and 3.5 years participating in WIC were eligible for this study. This age range was chosen to ensure that children would be old enough to be consuming solid foods regularly, yet still WIC eligible at the 18 month follow up.

A second cohort were mothers of preschoolers (African American n = 477, Hispanic n = 15) who participated in the Hip-Hop to Health Jr. Obesity Prevention Effectiveness Trial (Fitzgibbon et al., 2011). This was a randomized controlled trial testing the effectiveness of a 14-week teacher-delivered nutrition and physical activity intervention for preschoolers implemented in eighteen Head Start classrooms administered through Chicago Public Schools (CPS). A third cohort of 110 Hispanic mothers participated in a 14-week, family-based weight gain prevention pilot designed for 3 to 5 year old Hispanic children and their parents (Fitzgibbon et al., 2013). Families from the pilot study were recruited from four Head Start programs administered through CPS. In both of these studies, parent–child dyads were eligible as long as parents of children in participating classrooms provided written informed consent. The total study sample from all three cohorts consisted of 666 African-American and 296 Hispanic mothers with preschool-age children (2–5 years) who completed the CFQ at *baseline*.

Demographics and anthropometrics

Demographic information, including age, race/ethnicity, and parents' marital and educational status, was collected. Baseline measurements of children's heights and weights were used for this study. Trained data collectors weighed children without shoes and in light clothing on a digital scale and measured height using a portable stadiometer. Height (nearest 0.1 cm) and weight (nearest 0.1 kg) were measured twice and averaged for analyses. BMI percentiles for age and gender and z-scores, based on the 2000 Centers for Disease Control (CDC) Growth Charts, were calculated using a SAS program developed by the CDC. [http://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm accessed 4/4/2014].

Child feeding questionnaire

The Child Feeding Questionnaire (CFQ) was developed to measure child-feeding practices and attitudes of parents and their perception of their child's weight using a 5-point Likert scale (Birch et al., 2001). For this study, we examined five factors of the CFQ for model fit. A full description of CFQ factors, items, and frequency distributions are found in Appendix S1. The factors were: perceived feeding responsibility (PR1-3), concerns about child overweight (C14-16), restriction (R17-24), pressure to eat (PE25-28), and monitoring (M29-31). We excluded 'perceived parent weight' and 'perceived child weight' because these factors were only collected on a subsample of the study sample. Since previous research indicates instability with some of the items within the 'restriction' factor (Anderson et al., 2005; Boles et al., 2010; Corsini et al., 2008; Geng et al., 2009; Nowicka et al., 2014), we also tested a modified model that takes these two items (R21-22) from 'restriction' to form its own factor (i.e. Food as a reward) (Corsini et al., 2008; Liu et al., 2014) to produce a 6-factor model.

Previously, the internal consistencies of CFQ factors based on data from 394 mothers and fathers of 5–9 year old non-Hispanic white girls as reported by Birch et al. were as follows: 0.88 (Perceived responsibility), 0.75 (Concern about Child's Weight), 0.73 (Restriction), 0.70 (Pressure to eat), and 0.92 (Monitoring) (Birch et al., 2001). Boles et al. later reported the internal consistency of three factors on a sample of low-income, African-American mothers with preschoolers (n = 296) and reported alpha coefficients of 0.58 (Pressure to Eat),