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Development and Validation of the Infant Feeding Style Questionnaire

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Abstract

This study describes and validates the Infant Feeding Style Questionnaire (IFSQ), a self-report instrument designed to measure feeding beliefs and behaviors among mothers of infants and young children. Categorical confirmatory factor analysis was used to estimate latent factors for five feeding styles, laissez-faire, restrictive, pressuring, responsive and indulgent, and to validate that items hypothesized *a priori* as measures of each style yielded well-fitting models. Models were tested and iteratively modified to determine the best fitting model for each of 13 feeding style sub-constructs, using a sample of 154 low-income African-American mothers of infants aged 3-20 months in North Carolina. With minor changes, models were confirmed in an independent sample of 150 African-American first-time mothers, yielding a final instrument with 39 questions on maternal beliefs, 24 questions on behaviors and an additional 20 behavioral items pertaining to solid feeding for infants over 6 months of age. Internal reliability measures for the sub-constructs ranged from 0.75 to 0.95. Several sub-constructs, responsive to satiety cues, pressuring with cereal, indulgent pampering and indulgent soothing, were inversely related to infant weight-for-length z-score, providing initial support for the validity of this instrument for assessing maternal feeding beliefs and behaviors that may influence infant weight outcomes.

Keywords

feeding styles; confirmatory factor analysis; infant feeding; obesity; African-American

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Introduction

Rates of overweight and obesity among children and adolescents in the United States have tripled over the past twenty years and recent data indicate that more than one-third of children aged 2–19 are overweight or at risk of overweight (Ogden, Flegal, Carroll, & Johnson, 2002; Ogden et al., 2006). This problem is particularly acute in disadvantaged populations. Among African-American children, the prevalence of overweight increased by nearly 10% from the late 1980s to the late 1990s, a period during which increases among white children were small and non-significant (Mei et al., 1998; Ogden et al., 2006; Strauss & Pollack, 2001). These alarming increases and the seemingly refractory nature of childhood obesity (Dietz, 1998; Whitaker, Wright, Pepe, Seidel, & Dietz, 1997) have highlighted the importance of identifying factors contributing to early excess weight gain, particularly in high-risk groups.

Parental feeding practices and styles, the attitudes and behaviors that characterize parental approaches to maintaining or modifying children's eating behavior (Birch & Fisher, 1995; Golan & Crow, 2004; Patrick, Nicklas, Hughes, & Morales, 2005), shape the early feeding environment and, consequently, may be an important environmental factor in the intergenerational transmission of obesity (Birch & Fisher, 2000; Faith, Scanlon, Birch, Francis, & Sherry, 2004; Parsons, Power, Logan, & Summerbell, 1999; Powers, Chamberlin, van Schaick, Sherman, & Whitaker, 2006). Following Costanzo and Woody's (1979) suggestion that parents may adopt feeding domain-specific parenting styles and that these may be associated with child obesity, researchers have defined several feeding styles based on the degree to which parents are demanding or responsive during feeding.

Instruments such as the Child Feeding Questionnaire (CFQ) developed by Birch and colleagues (Birch et al., 2001; Johnson & Birch, 1994) have been used to illustrate that more restrictive, controlling feeding styles are associated with potentially obesogenic eating patterns (Birch & Fisher, 2000; Cutting, Fisher, Grimm-Thomas, & Birch, 1999; Fisher & Birch, 1999a, 1999b). These feeding styles, through their effects on inappropriate eating, are associated with higher child weight (Birch & Fisher, 2000; Johnson & Birch, 1994) and adiposity (Spruijt-Metz, Lindquist, Birch, Fisher, & Goran, 2002). While most research has focused on restrictive feeding styles, a more limited body of literature suggests that other feeding styles, including emotional or "indulgent" feeding, using food as a reward, and controlling feeding in the form of excess prompting or pressuring to eat, may also increase the risk of child overweight (Faith et al., 2004; Hurley, Black, Papas, & Caufield, 2008; Klesges et al., 1983; Patrick et al., 2005; Wardle, Sanderson, Guthrie, Rapoport, & Plomin, 2002).

Despite the higher incidence of pediatric obesity among minority groups (Ogden et al., 2006; Strauss & Pollack, 2001), the majority of studies exploring the association between feeding styles and overweight have been conducted among middle-class, white children and parents. Problematically, the relationship between controlling feeding styles and child overweight has not been as strongly replicated in more ethnically diverse samples (Baughcum et al., 2001; May et al., 2007; Robinson, Kiernan, Matheson, & Haydel, 2001; Spruijt-Metz et al., 2002). Robinson and colleagues (2001), for example, found in a sample of 3rd graders from varied ethnic and socioeconomic backgrounds, that BMI and adiposity were inversely, albeit weakly, related to maternal control. Similarly, African-American preschoolers with authoritarian, restrictive parents had lower BMI z-scores than children with indulgent parents (Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005). These seemingly contradictory results may be due at least in part to measurement issues. Ethnographic and epidemiological research suggests that predominant feeding styles may differ by ethnicity and socioeconomic status, with higher levels of uninvolved and indulgent

feeding styles described in African-American parents (Bentley, Gavin, Black, & Teti, 1999; Hughes et al., 2005; Sacco, Bentley, Carby-Shields, Borja, & Goldman, 2007; Sherry et al., 2004). Feeding style questionnaires may need to be adapted to more fully capture these other feeding styles, particularly if these styles are more relevant for the development of overweight and adiposity in ethnically diverse populations. Such a need is highlighted in validation studies of the CFQ, where items for measuring pressuring and restrictive styles did not perform as well among Hispanic (Anderson, Hughes, Fisher, & Nicklas, 2005; Birch et al., 2001) or African-American mothers (Anderson et al., 2005).

Studies of the association between feeding styles and overweight have focused primarily on preschool and school-aged children. However, both pediatric overweight and parental feeding styles may be established much earlier (Blissett & Farrow, 2007; Duke, Bryson, Hammer, & Agras, 2004). The prevalence of infant overweight, defined as a weight for length z-score >95th percentile, also appears to be increasing, particularly among minority infants. According to the most recently released figures from the Pediatric Nutrition Surveillance Study (Polhamus, Dalenius, Borland, Mackintosh, Smith & Grummer-Strawn, 2009), 10.4% of African American infants aged 0–11 months and 15.8% of those aged 12–23 months had weight for length z-scores greater than the 95th percentile. Feeding styles manifested in infancy may also be an important contributor to overweight risk both in infancy and later life. Maternal control of feeding as early as 6 months of age has been shown to influence rates of weight gain from 6 to 12 months among British infants (Farrow & Blissett, 2006). Using observational data collected during infant feeding episodes, Black and colleagues (2001) found that initially undernourished African-American children who were overweight at age 8 were more likely to have mothers who were assessed as being controlling during mealtimes when the children were infants. Further, the importance of the early feeding environment in shaping later overweight is strongly supported by recent studies showing that rapid weight gain in infancy is associated with later adiposity and overweight (Cameron, Pettifor, De Wet, & Norris, 2003; Monteiro, Victora, Barros, & Monteiro, 2003; Stettler, Kumanyika, Katz, Zemel, & Stallings, 2003; Stettler, Zemel, Kumanyika, & Stallings, 2002; Toschke, Grote, Koletzko, & von Kries, 2004) and that breastfeeding, a factor associated with greater infant control of feeding (Taveras et al., 2004), may be protective (Dewey, 2003; Dietz, 2001; Gillman et al., 2001; Owen, Martin, Whincup, Smith, & Cook, 2005). This association has been observed in several settings and ethnic groups, including African-Americans (Stettler et al., 2003).

Although the CFQ has been widely used to study child-feeding practices, few instruments exist to explore caregiver feeding styles for infants and toddlers. Baughcum and colleagues (2001) developed a questionnaire to retrospectively measure feeding behaviors and beliefs in the first year of life among a multi-ethnic sample of mothers of toddlers 11-24 months of age. However, this instrument focused predominantly on controlling and restrictive feeding styles and did not find strong evidence that these particular styles were related to prevalent overweight. A follow-up qualitative study suggested that low-income, African-American mothers might have interpreted the questions differently than intended and that salient beliefs about child feeding may not have been captured adequately by the instrument (Jain, Sherman, Chamberlin, & Whitaker, 2004). This and other qualitative studies indicate that ethnotheories (culture-specific beliefs and norms) may be an important influence on customary infant feeding styles in African-Americans (Bentley et al., 1999; Bronner et al., 1999; Corbett, 2000); yet, little is known about how infant feeding styles may influence over-feeding or the development of other inappropriate feeding behaviors in this high-risk population.

The present study describes the development and validation of the Infant Feeding Style Questionnaire (IFSQ), a comprehensive instrument measuring feeding beliefs and behaviors

among low-income African-American mothers of infants and young children. Developed based on formative ethnographic research (Bentley et al., 1999; Sacco et al., 2007) and work by Birch and colleagues (2001) among older children, the IFSQ includes items that assess parental beliefs and behaviors in 5 feeding style domains: 1) *laissez-faire*, in which the parent does not limit infant diet quality or quantity and shows little interaction with the infant during feeding; 2) *pressuring*/*controlling*, in which the parent is concerned with increasing the amount of food the infant consumes and uses food to soothe the infant; 3) *restrictive/controlling*, in which the parent limits the infant to healthful foods and limits the quantity of food consumed; 4) *responsive*, in which the parent is attentive to child hunger and satiety cues and monitors the quality of the child's diet and 5) *indulgent*, in which the parent does not set limits on the quantity or quality of food consumed. The aims of the present study were to: 1) test the *a priori* structure of the IFSQ, using confirmatory factor analysis, 2) validate the resulting structure in an independent sample of low-income African-American mothers and 3) explore the relevance of the IFSQ for the risk of overweight in infancy and early childhood.

Methods

Participants

Sample 1-IFSQ Pretest sample—The IFSQ was administered to a cross-sectional sample of 154 African-American mothers with children younger than 24 months. Women were recruited from Women, Infants and Children (WIC) clinics in central North Carolina from August through October 2003 and interviewed in a private area of the clinic or, later, in the participants' homes. Eligible women had a singleton infant aged 3-24 months, were aged 18-35 at the birth of the index child and had primary responsibility for infant feeding. Mothers were excluded if they had children with Down Syndrome, epilepsy, cleft lip or palate, cerebral palsy, failure to thrive, mental retardation, severe food allergies or any condition that might affect appetite, feeding or growth. Recruitment and data collection protocols were approved by the Institutional Review Board at the University of North Carolina at Chapel Hill.

Sample 2- Infant Care Sample—The sample (n=150) used to validate the structure of the IFSQ was drawn from participants in the Infant Care and Risk of Obesity Study (Lederman et al., 2004), an observational cohort study examining risk factors for the development of obesity in the first 18 months of life among low-income, African-American children in North Carolina. First-time mothers aged 18–35 years were recruited from WIC clinics in central North Carolina and were followed at infant ages 3, 6, 9, 12 and 18 months with home-visits. Data collection was conducted from 2003–2007 and 217 mothers and infants participated at baseline. As with the pre-test sample, mother-infant pairs were excluded if the infant was not born >35 weeks gestational age or had an illness or condition that might affect appetite, feeding or growth. A random sample of 30 infants with complete IFSQ data were chosen from each of the five visits to generate the validation sample, yielding a total sample of 150. This sample size was chosen to approximate the size of the IFSQ pretest sample. Cases selected in one visit were subsequently excluded from selection at the other visits to ensure an independent, cross-sectional sample with no repeated cases.

Measures

The Infant Feeding Style Questionnaire—A multidisciplinary team developed the IFSQ based on the ethnographic and observational data obtained in the formative phase of the study and the published literature. The IFSQ pretest assessed four of the feeding styles described above: laissez-faire, pressuring, restrictive and responsive. The indulgence portion of the IFSQ was added after the initial pre-test based on subsequent research linking

indulgent feeding styles with both child underweight and overweight (Hughes et al., 2005; Sacco et al., 2007). Within each feeding style, items examined several relevant sub-constructs, such as diet quantity, diet quality, satiety and the quality of attention or interactions. 48 items probed beliefs (coded on a 5-point scale: disagree, slightly disagree, neutral, slightly agree, agree) and 57 items probed behaviors (coded on a 5-point scale: never, seldom, half of the time, most of the time, always). Items related to each style were distributed randomly throughout the questionnaire, and a few items were coded inversely so that different responses would reflect more "ideal" parenting. Prior to administration, some items were reworded following cognitive testing with WIC-eligible African-American mothers of infants 0-24 months to confirm that subjects' understanding of each item matched the research team's intent.

In addition to these feeding styles, mothers were asked to report child birth weight, child's current weight and length, basic feeding practices (e.g. breastfeeding), child care patterns (e.g. use of daycare), and socio-demographic characteristics. Mothers also reported their own current weight and height.

Anthropometry—In the Infant Care sample, anthropometry was collected by trained study personnel using standard techniques. Infant weight was measured on a digital scale (Tanita BD-585 Digital Baby Scale) to the nearest 10gm. Recumbent length was measured to the nearest 0.1 cm by a two-person team, using a portable length board (O'Leary Length Board). All anthropometric measurements were done in triplicate and their mean was used in analysis. Weight-for-length z-scores (WLZ) were calculated using the CDC/NCHS 2000 growth reference (Ogden et al., 2002). Infant overweight status was calculated at the 85^{th} and 95^{th} percentiles of WLZ. Maternal height was measured to the nearest 0.1cm using a stadiometer (Harpenden) and maternal weight was measured on a digital scale (Seca 761) to the nearest 0.5kg. Maternal overweight was defined as a body mass index (BMI)>25kg/m^2 and maternal obesity was defined as a BMI>30kg/m^2.

Statistical Analysis

Questionnaire items were tabulated to identify items with a large proportion of non-response. The reported prevalence of each behavior (≥ half the time) and agreement with each belief are presented in Appendix 1. Several items regarding the consumption of solid foods had high non-response rates for young infants and were used only in supplementary analysis of feeding style measures among children ≥6 months. Stata 10 (Stata Corporation, College Station, TX) was used for all descriptive analysis.

Validation of feeding style factors—Confirmatory factor analysis (CFA) was used to estimate latent factors for each feeding style and to validate that items hypothesized *a priori* as measures of each style yielded good-fitting models. Since item responses ranged from 1–5 and variables had limited distributions, categorical CFA models with a mean and variance-adjusted weighted least squares estimator (wlsmv) were employed using Mplus version 5 (Muthen and Muthen, Los Angeles, CA). The WLSMV estimator has been documented to produce accurate test statistics with moderately-sized samples (n≥100) for medium-sized models (10-15 indicators) (Flora & Curran, 2004).

Separate models were fit for each of the four feeding styles incorporating all questionnaire items developed *a priori* as prospective measures of that style. These initial models had poor fit and, consequently, models were fit using smaller subsets of variables representing substantive sub-constructs or themes (e.g. restrictive with respect to amounts vs. quality of the diet). To ensure that each cell in the variance-covariance matrix included the same sample size, cases with missing data for the construct were removed via listwise deletion.

Model fit was evaluated based on three standard indicators of good overall fit: χ^2 p >0.05, root mean square error of approximation (RMSEA) ≤0.06 and comparative fit index (CFI) ≥ 0.90 (Bollen, 1989). The χ^2 test assesses model fit by comparing the obtained sample correlation matrix with the correlation matrix estimated by the model. Small χ^2 values indicate good fit between the observed and hypothesized models. Unlike the χ^2statistic, the CFI measures relative fit in relation to the "independent" or worst fitting model and is less sensitive to sample size. The CFI indicates increasingly good fit as values approach 1. The RMSEA reflects how closely the model fit approximates a reasonably well fitting model and values greater than.08 are thought to be indicative of a lack of parsimony in the model (Brown, 2006). Assessment of model fit between alternate models was based on Schwartz's Bayesian Information Criteria (BIC; Rafferty, 1995). This fit statistic compares the hypothesized model to a saturated model, with values less than −5.0 indicating a good fit, and allows for the comparison of non-nested models. In addition to these global measures, several indicators of component, or variable, fit were examined, including the magnitude and significance of factor loadings and polychoric correlations among items within constructs.

Poorly fitting initial models were iteratively modified to assess the effects of excluding variables with poor component fit and, if marginally poor overall fit persisted, covariances across error terms were included if they yielded substantial improvements in fit. Additional description of component fit and the model-fitting process beyond that summarized in the results text are available upon request. Since at least three items are required for identification of a CFA model, overall fit statistics could not be obtained from sub-construct models with fewer than three candidate items. These models were nonetheless retained if all components had a good fit and supplementary models using these core variables had good fit. Supplementary models (hereafter "≥6mo models") were fit using data from mothers of children aged six months or older to incorporate behavioral items related to the consumption of solid foods, which had large proportions of missing values among younger children. Indulgence models were also treated as supplementary models and fit only among children in the Infant Care sample, where we had survey data on the construct.

Overall fit statistics and individual item fit were compared across competing models to select the best fitting model for each sub-construct and are presented for the final models. Construct reliability was measured using the maximal reliability measure coefficient H (Hancock & Mueller, 2001), which is computed from standardized factor loadings and estimates the stability of the latent construct across multiple observed variables. Values of ≥0.80 are considered desirable for this measure. Finally, to examine how sub-constructs within each of the five broad *a priori* feeding styles were related to each other, multi-factor models were fit to simultaneously estimate latent factors for each theme, with covariances across the latent factors.

Calculating feeding style scores—Scores for each feeding style sub-construct were estimated as the mean of all items included in the model, accounting for reverse-coded variables, following previously published feeding questionnaire methods (Baughcum et al., 2001; Birch et al., 2001). Factor scores were generated in Mplus using the posterior distribution approach (Muthen, 1998–2004), taking into account factor loadings and covariances between the error terms. Pearson correlations (r) between the factor and feeding scores were >0.90 for all but one sub-construct, laissez-faire quality (r= 0.83). Given these high correlations and the same relative scaling between individuals using these two methods, feeding style scores were the primary variables used in further analysis for ease of application to and comparison with other studies.

Associations between feeding styles and child overweight—Finally, the association between each feeding style sub-construct and child weight-for-length z-score (WLZ) was assessed in the Infant Care sample. T-tests for continuous measures were used to assess group differences in feeding scores by infant WLZ. Individual multiple regression models were used to assess whether each feeding style was associated with infant size, controlling for potential confounders (maternal obesity, maternal age, maternal education, child age, child sex, birthweight and whether the child was ever breastfed).

Results

The IFSQ pretest and IC samples were similar in most sociodemographic and anthropometric characteristics (Table 1). The majority of mothers in each sample had only a high school education (60% pretest sample and 58% IC sample) and nearly half of the mothers in each sample were obese with an additional one-fourth overweight. The samples did vary in the proportion of mothers reporting a yearly household income below $30,000 (78.4% and 71.3%, $\chi 2$ p=.02) and, by design, in maternal parity.

Feeding style model constructs

Laissez-faire feeding—Laissez-faire feeding styles were assessed through two sub-constructs: i) laissez-faire in attentiveness to the child and ii) laissez-faire with respect to diet quality. The initial laissez-faire attention model included five candidate items and had poor fit. Fit was improved with the addition of an error covariance between child's TV watching during feeding (LF2) and mother's TV watching (LF3; Table 2). The model for second sub-construct, laissez-faire diet quality, had a good fit after the inclusion of an error covariance between belief items regarding toddlers' selection of snack foods (LF10) and restaurant meals (LF11). A supplementary model of diet quality for children ≥6mo included two additional items asking whether mothers limited junk food (LF9) and consumption of sweets (LF8) with a covariance between these items and also had good overall fit.

Pressuring/overfeeding—Three CFA models were fit for pressuring/overfeeding: (i) pressuring to finish, (ii) pressuring with cereal and (iii) pressuring as soothing. The first model, pressuring to finish, included items assessing maternal beliefs and strategies to increase infant and toddler food intake, and had poor initial fit (Table 2). Fit was improved by adding covariances between the items "encourage a child to finish if full" (PR2) and "coax child to eat when not hungry" (PR4), and between "important for infant to finish milk"(PR8) and "important for toddler to clean plate" (PR7). Two additional behaviors, insisting a child re-try new foods during the same meal (PR5) and praising the child after each bite (PR6), fit well in the supplementary model among children ≥6mo. All candidate items had good fit in the second construct, pressuring with cereal, and were retained in the model. Borderline initial fit was improved by incorporating a covariance term between the items, "putting cereal in the bottle helps an infant feel full"(PR13) and "putting cereal in the bottle helps an infant sleep" (PR12), two concepts closely related in theory and practice. No modifications were required for the third construct, pressuring as soothing. Model fit for the pressuring with cereal and pressuring as soothing sub-constructs was nearly identical for infants ≥ 6 months and is not presented.

Restrictive feeding—Items about restriction were split into two sub-constructs: i) restrictive with respect to amounts consumed and ii) restrictive with respect to diet quality. The restrictive amount model, which explored maternal control over the amounts infants ate and their beliefs that they should decide how much their children ate, had a good overall fit after the inclusion of an error covariance linking controlling the quantity child eats (RS1) and being careful not to overfeed (RS2), two items likely to elicit a similar response. The

five-item restrictive diet quality model, which focused on mothers' beliefs with respect to consumption of junk foods, sweets and fast food, had a good initial fit. Two additional behavioral items regarding allowing the consumption of junk (RS6) and fast food (RS5) were included in the model among children ≥6mo and this model had good fit with the inclusion of an error covariance between these items.

Responsive feeding—Two models were fit for responsive feeding: i) responsiveness to satiety and hunger cues and ii) responsive attention and interactions. The model for responsiveness to satiety cues had good overall fit based on all indicators. The full model initially had only marginal fit among infants ≥ 6 months and an error covariance was added, based on modification indices, between the behavioral item "I pay attention when child signals fullness"(RP4) and the belief item "a child knows when he/she is full"(RP1) to improve fit. For the responsive attention sub-construct, questionnaire items focused on the quality of maternal-child interactions during feeding. Two candidate belief items, whether it was okay for the child to make a mess and whether toddlers' food should be within their reach, were unexpectedly inversely correlated with the latent factor and were of borderline and poor significance, respectively. The exclusion of these items led to a final primary model that included only three items focused on encouraging the child to eat. Measures of overall fit are not available for models with three items. However, the remaining items had significant and relatively high factor loadings (>0.50; Appendix I). The model for children ≥ 6 months included two additional variables, showing the child how to eat table foods (RP10) and encouraging the child to try new foods (RP11). Indicators of overall fit were good for this model with the inclusion of an error covariance between the behavior and belief items that a toddler needs encouragement to eat (RP9 and RP12).

Description of final models

Factor loadings from the final all child models ranged from 0.22 to 1.00 and were statistically significant (Appendix 1). Items within each construct were generally moderately to strongly correlated, while correlations among items from different constructs were generally weak (<0.25) and non-significant, supporting the use of feeding style sub-constructs. Internal reliability was assessed through the H coefficient and values were ≥0.80 for all but three sub-constructs (restrictive amounts, pressuring to finish and pressuring with cereal) where values were ≥0.75 (Table 3).

Correlations among feeding style factors—Correlation analysis of feeding scores across sub-constructs (Table 4) and multiple factor CFA models indicated that sub-constructs within each feeding style were generally moderately or non-significantly associated. Only the three sub-constructs for pressuring were moderately but significantly associated, with correlations ranging from 0.20 for pressuring with cereal and soothing to 0.30 for pressuring to finish with soothing. Similarly, multi-factor CFA covariances ranged from 0.20 for cereal with soothing to 0.28 for finishing with soothing.

As expected, feeding constructs were generally uncorrelated to moderately correlated across feeding styles (r<0.30; Table 4). Correlations across styles ranged from r=−0.03 for laissez-faire attention and responsive satiety to r=0.58 for responsive attention and pressuring to finish. Although correlations across feeding styles were mostly consistent with prior hypotheses, there were several unexpected findings. Laissez-faire attention was positively correlated with higher scores for both pressuring with cereal (r=0.24, p=.005) and pressuring as soothing (r=0.22, p=.008), while responsive attention and pressuring to finish (r=0.58, P<.0001) were strongly correlated. A positive albeit weaker correlation was also found between laissez-faire attention and responsive attention (r=0.20, p=.02).

Distribution of feeding scores—The highest mean scores—indicating higher levels of agreement with beliefs and reported practicing of behaviors—were seen for responsive satiety (4.41±0.53) and restrictive amounts (4.09±0.83) sub-constructs (Table 3). Scores were lowest for laissez-faire diet quality (1.59±0.68). Overall, mothers scored highest on responsive feeding constructs (4.07±0.58) and lowest on laissez-faire feeding constructs (1.78±0.52).

Validation in the IC sample

Confirmation of final models—Final models developed in the IFSQ pretest sample were tested in the cross-sectional IC sample. With a few exceptions, the developed models also had good fit in this second sample and no additional modifications were required for restrictive amount, restrictive quality, pressuring with cereal, pressuring with soothing and responsive attention constructs. The responsive satiety model had a marginal fit ($\chi 2$ p=0.01, CFI=0.95, RMSEA=0.10, BIC=−21.22) and was improved with the addition of an two error covariances between the belief and behavior items of “child knows when full”(RP1 and RP6) and between “pay attention when child signals fullness/hunger”(RP4) and “allow child to eat when hungry”(RP5).

Model fit was more problematic for the laissez-faire constructs. For the laissez-faire attention sub-construct, model fit was improved by dropping the non-significant variable “it’s okay for the child to walk around as long he or she eats” (LF5). This modification yielded a well fitting model ($\chi 2$ p=0.44, CFI=1.00, RMSEA=.00, BIC=−4.41). Model fit indices for laissez-faire diet quality were marginal to good ($\chi 2$ p=0.04, CFI=0.98, RMSEA=0.14, BIC=−0.96), but component fit was poor. No modifications improved the model. Items concerning a toddler’s selection of snacks (LF10) and restaurant meals (LF11) had low factor loadings (<0.30) in the validation sample, which may indicate that these variables should be dropped from the model. However, both items were significant in the IFSQ sample and in children ≥6mo in the IC sample.

Indulgence models—The structure of the indulgence portion of the IFSQ was tested in the IC sample only. Items examined maternal beliefs and behaviors related to the practices of allowing infants and young children to eat in front of the television and to consume junk foods and sugary drinks and were divided into four sub-constructs: permissive, coaxing, pampering and soothing. For each construct, initial models were fit with four belief items and one behavioral item, allowing the child to eat in front of the television, since behavioral items assessing the consumption of fast foods, soda/sugared drinks and desserts had a low response rate for children <6 months. Initial model fit was improved for all constructs with the inclusion of an error covariance between the belief and behavior items regarding television watching while eating (Table 2). Additional modifications improved fit in two sub-constructs, permissive and soothing. For the permissive sub-construct, model fit was highly improved with the inclusion of an additional covariance between the items, “If a toddler wants to drink sugared drinks, s/he should be allowed” (ID3) and “If a toddler wants to eat desserts or sweets, s/he should be allowed” (ID4). Model fit was improved in the soothing sub-construct with the inclusion of an error covariance (suggested by modification indices) between the belief a child should be allowed to watch TV while eating (ID17) and the belief that a child should be given sugared drinks to keep them from crying (ID19).

In the ≥ 6month models, three additional behavioral variables were included in each model. Of these supplementary models, only the coaxing construct had good fit after the inclusion of error covariances between the behavioral items. Model fit remained marginal for the remaining constructs.

Association with infant weight-for-length z score and risk for overweight— Exploratory analysis of the differences in infant weight-for-length z-scores (WLZ) associated with feeding style scores documented that WLZ was lower in infants whose mothers had higher scores (>median) for responsiveness to satiety cues (difference=−0.39 z-scores, p=0.03) and pressuring with cereal (difference=−0.52 z-scores, p=0.003). Multiple regression analysis of the association between WLZ and continuous feeding style scores controlling for potential confounders yielded similar results for these constructs and also revealed significant associations between the indulgence constructs and WLZ. A one-unit increase in responsiveness to satiety cues was associated with a 0.36 decrease in WLZ-score (p=0.04), controlling for infant birthweight (the only covariate with a p<0.20). Pressuring with cereal scores were also associated with lower WLZ (β=−0.48, p=0.07), although this result was no longer significant at the p<.05 level when potential confounders were included in the model. Similarly, the indulgence pampering and soothing sub-constructs were associated with a lower WLZ (β=−0.20, p=0.03 and β=−.14, p=0.02, respectively). Indulgence-permissive and indulgence-coaxing were marginally associated with lower WLZ scores when controlling for significant covariates (β=−0.22, p=0.05 and β=−0.38, p=0.08, respectively).

Discussion

The results of CFA validation of the IFSQ demonstrate that: 1) models for sub-constructs within the five domains of feeding beliefs and behaviors (laissez-faire, pressuring, restrictive, responsive and indulgent) determined *a priori* from instruments used with older children (Birch et al, 2001) and generated from formative research have an overall acceptable fit in two independent samples of low-income African-American mothers of infants and young children; 2) sub-constructs within these feeding styles were generally independent of each other; and 3) feeding scores for responsive and pressuring feeding styles are relatively high, highlighting the need for further investigation of the influence of these styles on infant dietary intake and weight gain.

This first finding, the ability to validate infant feeding styles previously related to obesity in older children, may be particularly important from a methodological perspective. Validation of the IFSQ provides an instrument for capturing feeding styles in infants that can be applied to future explorations of infant feeding. Of the five feeding styles measured across 13 sub-constructs in the IFSQ, the majority had good fit that was consistent across samples, despite differences in maternal parity, household income and prevalence of child overweight and underweight. The resulting IFSQ (available by e-mail upon request) includes 39 items for assessing maternal beliefs, 24 items for assessing reported behaviors for all infants and young children and an additional 20 behavioral items assessing solid feeding in infants over 6 months.

Models for restrictive and pressuring to finish styles, those most extensively explored in other studies (Baughcum et al., 2001; Birch et al., 2001; Farrow & Blissett, 2008; Powers et al., 2006), had the best fit in our samples as well. Few modifications were needed to improve model fit and most items considered *a priori* to relate to the latent feeding style factor had good component fit and were retained. Similarly, models measuring maternal responsiveness to satiety cues had good model fit as well as the highest feeding scores of all sub-constructs. The model for responsive attention, however, only had three retained items and overall fit could not be assessed. These remaining items, which focused on maternal encouragement to eat, had good component fit and the supplementary models incorporating these core items had good overall fit as well. More than 90% of mothers in the pretest sample agreed or strongly agreed that it was important to encourage a toddler to eat and more than 60% of this sample stated that they talked to their child to encourage eating or

drinking milk at least half the time. These data suggest that attentiveness may be an important component of a responsive feeding style. Additional items may be needed to adequately assess this construct, particularly since responsive feeding has been associated with healthier eating behaviors among older children, including the increased consumption of fruits and vegetables among African-American preschoolers (Patrick et al., 2005).

Laissez-faire models were the most problematic for model fit. Several items in both constructs had low or marginally significant factor loadings, and model fit varied in the IFSQ pretest and Infant Care samples. On the other hand, examination of the individual item responses for the factor documented that the prevalence of some laissez-faire behaviors was quite high. 46% of the mothers reported watching television while feeding their infants at least half the time, a behavior which we interpret as inattentive to the infant, and a similar proportion of mothers of infants older than six months allow them to eat junk foods and sweets at least half the time, a practice that may indicate lack of concern about dietary quality. These results indicate that such behaviors and beliefs may be common in this sample but may not be fully capturing a coherent feeding style. Indeed, previous studies of feeding behaviors in African-American mothers have noted a high prevalence of laissez-faire behaviors (Hughes et al., 2005; Sacco et al., 2007), indicating that further refinement of this construct may be important.

The structure of the indulgence portion of the IFSQ was tested only in the IC sample and further validation in other samples is required. The prevalence of indulgent behaviors and agreement with indulgent beliefs was quite low. Nonetheless, the observed relationship between child weight status and the indulgence sub-constructs suggests that these may be important feeding styles to more fully explore.

Unlike previous feeding style questionnaire validation (Baughcum et al., 2001; Birch et al., 2001), feeding styles were modeled independently across 13 sub-constructs owing to the greater level of detail in the IFSQ. Results of both correlation analysis and multi-factor modeling indicate that, with the exception of the pressuring feeding style, these sub-constructs are indeed measuring separate domains. Mothers who were laissez-faire with respect to diet quality, for example, were not necessarily inattentive to their child's eating. The only significant relationship between sub-constructs of a feeding style were seen among the pressuring constructs where mothers who pressured their children to finish their food/drinks were also likely to believe that children need more food to feel full or sleep and to give their children food and drinks to soothe them. These results suggest that more general explorations of feeding styles may obscure important components of feeding beliefs and behaviors among mothers of infants and young children.

The use of separate sub-constructs further allowed evaluation of the patterns of relationships across feeding style components. These associations were generally consistent with prior hypotheses; for example, mothers with high scores for being responsive to hunger and satiety cues did not have high scores for any of the pressuring constructs. However, several unexpected associations were found, one of which was the strong positive correlation between responsive attention and pressuring to finish. This finding suggests the beliefs and behaviors assessed by these constructs may lie on a continuum of response, with responsive strategies (talking with child to encourage eating) perhaps leading to more pressuring strategies (making sure child cleans plate). Another unexpected relationship was the positive association between laissez-faire attention and responsive attention, which would be hypothesized to be inversely related. This association means that mothers who were more likely to report behaviors such as propping infant bottles and letting their children watch TV and walk around while eating were also more likely to talk to their child to encourage eating. While low (0.20), this correlation may reflect a more relaxed atmosphere around mealtimes

or may indicate that the responsive attention factor only captures the portion of responsiveness that is associated with encouraging children to eat. This type of responsiveness may not be mutually exclusive with the inattention associated with watching television while eating or allowing a child to walk around while eating. Contextual research on the maternal and infant characteristics and home environment associated with these feeding styles may help to clarify these unexpected associations.

Comparison of mean feeding scores indicates that responsive and restrictive styles had the highest proportions of mothers agreeing with or reporting performing the included behaviors while laissez-faire and indulgent styles had the lowest. The high feeding scores for restrictive feeding align with previous reports, where higher levels of restrictive and controlling feeding styles were reported by African-American mothers of young children compared to White mothers (Hughes et al., 2005; Hurley et al., 2008; Spruijt-Metz et al., 2002). Similarly, in the observational, formative study that preceded the development of the IFSQ, Sacco et al (2007) found that the majority of mothers had restrictive styles. On the other hand, these studies also report high levels of pressuring, laissez-faire and/or indulgent styles in African-American mothers (Hughes et al., 2005; Hurley et al., 2008; Sacco et al., 2007; Spruijt-Metz et al., 2002) whereas we documented higher scores on responsive feeding than any of these other styles. While we cannot definitively say that mothers in our sample are translating these reported responsive beliefs and behaviors in to everyday practice, the high scores for the responsiveness sub-constructs indicate that mothers are aware of appropriate feeding behaviors. Moreover, higher scores for maternal responsiveness to satiety/hunger cues in this sample were inversely associated with current infant size.

Mean scores for pressuring were intermediate; nonetheless, a substantial proportion of mothers (52% in both samples) reported regularly putting cereal in their infants' bottles, a behavior that has been shown to be culturally important in other African-American samples (Bentley et al., 1999; Bronner et al., 1999; Corbett, 2000). While this practice is thought to increase the amount of energy consumed and promote infant overweight (Solem, Norr, & Gallo, 1992), pressuring with cereal in our sample was associated with lower WLZ. These results, indicating that mothers who pressure their children to eat have leaner children, have been found in a number of studies of both White and African-American children (Blissett & Farrow, 2007; Francis, Hofer, & Birch, 2001; Powers et al., 2006), where it has been suggested that mothers may be concerned with increasing the intake of their smaller infants.

A similar interpretation may underlie the association we found between higher indulgence feeding scores and lower WLZ scores. However, previous research in African-American children has found that those with indulgent parents have higher, not lower, body mass index compared to children with more responsive parents (Hughes et al., 2005). These discordant results may be due to differences in the age of children studied (infant vs. preschool) or differences in the dynamics of mother-child interactions at these younger ages. Recent work has suggested that less responsive and more indulgent feeding styles may be associated with maternal mental health, particularly depressive symptoms, and maternal perceptions of infant temperament (Hurley et al., 2008). Further research may be needed to understand not only how maternal characteristics may determine both infant feeding styles and adiposity, but also how infant characteristics may shape maternal feeding beliefs and strategies.

This study is not without limitations. While allowing for more fine-grained analysis, the relatively large number of items in the IFSQ compared to other feeding style questionnaires may have affected participant responses, particularly on similarly-worded questions. To minimize the effect of repetitive questions, items pertaining to each style were randomly

distributed throughout the questionnaire and several items were reverse-coded. The refined questionnaire has 22 fewer questions, which should serve to minimize any existing respondent burden in future applications of the IFSQ. Since the IFSQ was designed through formative research with and validated among a sample of exclusively African-American mothers, its generalizability to other ethnic groups remains unknown; additional formative research may be needed to refine the instrument and establish validity across other populations. However, many of the factors that characterize this sample, such as low educational attainment and high levels of overweight, may be similar across low-income populations. Broader utilization of the IFSQ has the potential to elucidate important cultural similarities and differences in maternal feeding beliefs and practices that may ultimately contribute to child overweight. The cross-sectional nature of this validation study limits the inferences that can be made about directionality in the relationship between maternal feeding styles and infant weight. Like all cross-sectional examinations of the relationship between infant size and maternal behaviors, we cannot say with these data that reported maternal beliefs and behaviors *cause* differences in child WLZ as opposed to being a response to infant size.

Despite these limitations, the IFSQ represents a methodological advance in the measurement of feeding styles in infancy, including a range of feeding styles sub-constructs and a broad spectrum of belief and behavioral items. Preliminary evidence establishes validity in two independent samples of African-American mothers of infants and toddlers. While future longitudinal analysis is needed to more adequately address both the potential bidirectionality between maternal feeding styles and infant size and the important mediating effects of actual feeding practices in the association between feeding styles and infant weight gain and adiposity (Ventura & Birch, 2008), the documented associations between feeding styles and infant size in the present study suggest that the IFSQ is an effective instrument for addressing these questions.

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Table 1

Sociodemographic and anthropometric characteristics of the samples

	N	Pre-test Sample		N	IC Sample		p[a]
		Mean/%	SD		Mean/%	SD	
Sample size	154			150			
Family characteristics							
Mother's age	154	25.9	4.9	150	23.2	3.9	<.001
Mother's edu>HS	151	39.1%	-	150	41.3%	-	0.69
Mother not working	151	53.6%	-	143	44.8%	-	0.13
-works full-time		31.8%	-		36.5%	-	0.14
-works part-time		14.6%	-		23.8%	-	0.14
Mother married	151	16.8%	-	150	9.3%	--	0.06
Parity	154	2.2	1.2	150	1	0.0	<0.001
HH income (%<$30k)	151	78.4%	-	101	71.3%	-	0.02
Mother's BMI (kg/m^2)	151	29.8	7.8	150	31.2	7.8	0.11
Mother normal weight[b]	151	30.5%	-	150	20.6%	-	0.13
-overweight		22.5%	-		24.0%	-	0.13
-obese		46.4%	-		52.7%	-	0.27
Father's BMI (kg/m^2)	138	27.7	6.2	150	27.0	5.7	0.31
Father normal weight[b]	138	39.9%	-	150	37.3%	-	0.50
-overweight		31.2%	-		33.2%	-	0.18
-obese		28.3%	-		27.7%	-	0.41
Child characteristics							
Age (mos)	154	9.5	7.2	150	10.1	5.3	0.40
Sex (% female)	154	49.4%	-	150	55.3%	-	0.29
Birth weight (kg)	154	3.19	0.7	150	3.26	0.5	0.32
Ever breastfed	154	60.4%	-	150	70%	-	0.08
Weight-for-height %[c]	79	72.6	26.9	150	71.2	23.6	0.79
Overweight	79	27.9%	-	150	16%	-	0.03
Underweight	79	13.9%	-	150	1.3%	-	0.02

[a] p-values for differences between samples (t-tests continuous variables, chi-square tests categorical variables).

[b] Adult overweight defined as BMI >25.0; obesity as BMI >30.0.

[c] NCHS referent used for child anthropometry percentiles. Child overweight defined as weight-for-height >95th percentile, underweight as <5 th percentile. For the pretest sample, child weight and height, from maternal recall, was reliable for 51.3% of the sample (not reported for 31.1%; implausible or outdated for 17.5%). Children with missing data were similar in sex, as well as in maternal age, parity, BMI and work status, but were older and had less educated mothers.

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Table 2

Goodness of fit indices for feeding style sub-constructs

Factor	Model	Model detail	χ2 p value	RMSEA	CFI	BIC
Laissez-Faire (N=142 all children, N=93 ≥6mo)						
Attention	Initial model (all)	5 items	.009	.12	.91	−9.46[a]
	Final model (all)	5 items + error covariance LF2- LF3	.74[a]	.00[a]	1.00[a]	−17.83[a]
Diet Quality	Initial model (all)	4 items	.00	.31	.85	19.12
	Final model (all)	4 items + error covariance LF10-LF11	.20[a]	.07[b]	.99[a]	−3.34[b]
	Initial model (≥6mo)	6 items	.00	.24	.80	7.44
	Final model (≥6mo)	6 items +error covariances LF10- LF11 and LF8-LF9	.55[a]	.00[a]	1.00[a]	−18.45[c]
Pressuring (N=145 all children, N=90 ≥6mo)						
Finish	Initial model (all)	6 items	0.00	0.17	0.82	−1.72
	Final model (all)	6 items +error covariances PR2- PR4 and PR7-PR8	0.49[a]	0.00[a]	1.00[a]	−24.41[a]
	Initial model (≥6mo)	8 items	0.00	0.19	0.75	−1.84
	Final model (≥6mo)	7 items- dropped PR8 + error covariances PR2-PR4 and PR5- PR6	0.09[a]	0.09[b]	0.95[b]	−22.13[a]
Cereal	Initial model (all)	5 items	0.05[a]	0.10	0.97[a]	−10.28[a]
	Final model (all)	5 items +error covariance PR14-PR15	0.70[a]	0.00[a]	1.00[a]	−13.33[a]
Soothing	Initial model (all)	4 items	0.90[a]	0.00[a]	1.00[a]	−9.81[a]
Restrictive (N=151 all children, N=90 ≥6mo)						
Amount	Initial model (all)	4 items	.001	.20	.84	3.55
	Final model (all)	4 items +error covariance RS1- RS2	.82[a]	.00[a]	1.0[a]	−3.72
Diet Quality	Initial model (all)	5 item	.40[a]	.01[a]	1.0[a]	−16.11[a]
	Initial model (≥6mo)	7 item	.02	.11	.96[a]	−23.34[a]
	Final model (≥6mo)	7 item +error covariance RS5- RS6	.11[a]	.09	.97[a]	−25.29[a]
Responsive (N=149 all children, N=90 ≥6mo)						
Satiety	Initial model (all)	7 item	.55[a]	.00[a]	1.00[a]	−41.24[a]
	Initial model (≥6mo)	7 item	.03	.11	.96[a]	−21.88[a]

Factor	Model	Model detail	χ2 p value	RMSEA	CFI	BIC
	Final model (≥6mo)	7 item +error covariance RP1- RP4	.25[a]	.05[a]	.99[a]	−26.15[a]
Attention	Initial model (all)	3 item	NA	NA	NA	NA
	Initial model (≥6mo)	5 item	.03	.13	.91	−12.46[a]
	Final model (≥6mo)	5 item +error covariance RP9- RP12	.55[a]	.00[a]	1.00[a]	−25.54[a]
Indulgent[c] (N=150 all children, N=115 ≥6mo)						
Permissive	Initial model (all)	5 item	.0001	0.18	0.92	2.74
	Final model (all)	5 item+ error covariances ID1- ID5 and ID7-ID8	0.77[a]	0.00[a]	1.00[a]	−13.88[a]
	Initial model (≥6mo)	8 item	<.0001	0.24	0.83	18.33
	Final model (≥6mo)	8 item+ error covariances ID1- ID5, ID7-ID8, ID2-ID3 and ID2-ID4	.02	0.11	0.97[a]	−20.97[a]
Coaxing	Initial model (all)	5 item	<.0001	0.26	0.92	18.24
	Final model (all)	5 item+ error covariances ID9- ID13	.04[b]	0.11	0.99[a]	−6.92[a]
	Initial model (≥6mo)	8 item	<.0001	0.22	0.87	10.80
	Final model (≥6mo)	8 item+ error covariances ID9- ID13, ID10-ID11, ID10-ID12	.24[a]	0.06[a]	0.99[a]	−33.24[a]
Soothing	Initial model (all)	5 item	<.0001	0.20	0.94	8.72
	Final model (all)	5 item+ error covariances ID17- ID21 and ID17-ID23	0.69[a]	0.00[a]	1.00[a]	−13.54[a]
	Initial model (≥6mo)	8 item	<.0001	0.26	0.91	22.42
	Final model (≥6mo)	8 item + error covariances ID17-ID21, ID17-ID23, ID18- ID22 and ID22-ID23	.001	.02[a]	0.97[a]	−10.20[a]
Pampering	Initial model (all)	5 item	.001	0.16	0.98[a]	0.10
	Final model (all)	5 item+ error covariances ID25- ID29	.17[a]	0.07	1.00[a]	−10.04[a]
	Initial model (≥6mo)	8 item	<.0001	0.25	0.89	17.73
	Final model (≥6mo)	8 item + error covariances ID25-ID29, ID26-ID27, ID27- ID28, ID26-ID28	.01	0.13	0.97[a]	−15.49[a]

[a]Indicates good fit.

[b]Indicates marginally good fit.

[c]Measured in the ICP sample only

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Table 3

Descriptive statistics and reliability for the final feeding style constructs

Factor	Mean	SD	Range		Reliability[a]
			min	max	
Laissez-faire	1.78	0.52	1	3.34	
diet quality	1.59	0.68	1	4.25	0.91
attention	1.95	0.73	1	4.40	0.80
Pressuring	2.32	0.63	1	4.13	
finish	2.20	0.78	1	4.33	0.79
cereal	2.76	1.05	1	5.00	0.78
soothing	2.04	0.84	1	5.00	0.84
Restrictive	3.62	0.68	1.13	5.00	
amount	4.09	0.83	1.25	5.00	0.75
diet quality	3.15	1.00	1	5.00	0.85
Responsive	4.07	0.58	2.19	5.00	
satiety	4.41	0.53	2.56	5.00	0.92
attention	3.73	1.01	1	5.00	0.84
Indulgent [b]	1.67	0.60	1	3.55	
permissive	2.06	0.77	1	4.20	0.82
coaxing	1.55	0.63	1	3.80	0.89
soothing	1.51	0.63	1	3.60	0.87
pampering	1.57	0.65	1	3.80	0.94

[a] Calculated using H coefficient (Hancock and Mueller 2001)

[b] Scores are from the IC sample

Table 4

Correlations within and between nine feeding style sub-constructs[a]

Construct	1	2	3	4	5	6	7	8	9
1. Laissez-faire diet quality	1								
2. Laissez-faire attention	0.08	1							
3. Restrictive diet quality	−0.22*	−0.15	1						
4. Restrictive amount	−0.31*	0.04	0.09	1					
5. Responsive satiety	−0.03	−0.04	0.07	−0.12	1				
6. Responsive attention	−0.21*	0.20*	−0.04	0.26*	0.05	1			
7. Pressuring finish	−0.14	0.10	0.08	0.14	−0.01	0.58*	1		
8. Pressuring cereal	−0.02	0.24*	0.01	0.10	0.03	0.14	0.26*	1	
9. Pressuring soothing	0.04	0.22*	0.04	−0.09	0.03	0.17*	0.30*	0.20*	1

[a]Pearson correlations of continuous feeding scores within and across sub-constructs. Correlations between sub-constructs of the same feeding style are indicated by shaded boxes;

*p<0.05

Appendix 1

Factor loadings and item response for IFSQ items

Feeding Style	Item Description	Item Response %[a]	Factor Loading	Item Response %[a]	Factor Loading
Laissez-Faire		**All children (n=142)**		**≥6mo (n=93)**	
Attention	*Behavior items*				
LF1	When (name of child) has/had a bottle, I prop/propped it up	19.3	1.00[b]	17.3	1.00[b]
LF2	(Child) watches TV while eating	27.1	0.41*	27.0	0.56*
LF3	I watch TV while feeding (child)	46.4	0.31*	35.6	0.48*
	Belief items				
LF4	I think it is okay to prop an infant's bottle	16.9	0.87*	17.2	0.90*
LF5	It's okay for a toddler to walk around while eating as long as s/he eats	9.2	0.50*	8.6	0.55*
Diet quality	*Behavior items*				
LF6	I keep track of what food (child) eats[d]	95.1	1.00[b]	94.0	1.00[b]
LF7	I keep track of how much food (child) eats[d]	89.5	0.80*	84.5	0.77*
LF8	I make sure (child) does not eat sugary food like candy, ice cream, cakes or cookies[c,d]		-	58.3	0.18
LF9	I make sure (child) does not eat junk food like potato chips, Doritos and cheese puffs[c,d]		-	58.3	0.24*
	Belief items				
LF10	A toddler should be able to eat whatever s/he wants for snacks	7.2	0.33*	9.6	0.37*
LF11	A toddler should be able to eat whatever s/he wants when eating out at a restaurant	9.1	0.22	10.7	0.18
Pressuring		All children (n=145)		≥6mo (n=90)	
Finishing	*Behavior items*				
PR1	Try to get (child) to finish his/her food	67.8	1.00[b]	77.7	1.00[b]
PR2	If (child) seems full, encourage to finish anyway	7.3	0.90*	9.6	0.83*
PR3	Try to get (child) to finish breastmilk or formula	56.5	0.98*	57.1	1.10*
PR4	Try to get (child) to eat even if not hungry	14.6	0.74*	16.0	0.77*
PR5	Insist retry new food refused at same meal[c]	-	-	43.6	0.93*
PR6	Praise after each bite to encourage finish food[c]	-	-	73.4	0.94*

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Feeding Style	Item Description	Item Response %[a]	Factor Loading	Item Response %[a]	Factor Loading
Laissez-Faire		**All children (n=142)**		**≥6mo (n=93)**	
	Belief Items				
PR7	Important for toddler finish all food on his/her plate	21.4	0.49*	21.9	0.83*
PR8	Important for infant finish all milk in his/her bottle	14.9	0.39*	12.5	-
Cereal	*Behavior items*				
PR11	Give/gave (child) cereal in the bottle	52.2	0.66*	57.6	0.69*
	Belief items				
PR12	Cereal in bottle helps infant sleep thru the night	50.0	1.00[b]	52.1	1.00[b]
PR13	Putting cereal in bottle good b/c helps infant feel full	51.0	0.73*	43.1	0.73*
PR14	An infant <6 mo needs more than formula or breastmilk to be full	40.3	0.57*	39.6	0.72*
PR15	An infant <6 mo needs more than formula or breastmilk to sleep through the night	21.4	0.69*	22.9	0.83*
Soothing	*Behavior items*				
PR16	When (child) cries, immediately feed him/her	22.7	0.70*	13.8	0.70*
	Belief items				
PR17	Best way to make infant stop crying is to feed	11.0	1.00[b]	6.3	1.00[b]
PR18	Best way to make toddler stop crying is to feed	9.1	0.95*	7.5	1.15*
PR19	When infant cries, usually means s/he needs to be fed	49.4	0.65*	50.0	0.97*
Restrictive		All children (n=151)		≥6mo (n=90)	
Amount	*Behavior items*				
RS1	I carefully control how much (child) eats	82.2	0.57*	82.1	0.48*
RS2	I am very careful not to feed (child) too much	88.1	0.34*	81.3	0.47*
	Belief Items				
RS3	Important parent has rules re: how much toddler eats	64.9	1.00[b]	87.5	1.00[b]
RS4	Important parent decides how much infant should eat	85.7	0.85*	69.8	0.61*
Diet Quality	*Behavior items*				

Feeding Style	Item Description	Item Response %[a]	Factor Loading	Item Response %[a]	Factor Loading
Laissez-Faire		**All children (n=142)**		**≥6mo (n=93)**	
RS5	I let (child) eat fast food[c]	-	-	28.17	0.54*
RS6	I let (child) eat junk food[c]	-	-	33.33	0.43*
	Belief items				
RS7	A toddler should never eat fast food	34.41	1.00[b]	37.50	1.00[b]
RS8	An infant should never eat fast food	66.89	0.34*	57.29	0.71*
RS9	A toddler should never eat sugary food like cookies	44.15	0.81*	51.04	0.87*
RS10	A toddler should never eat junk food like chips	31.16	0.95*	30.21	0.79*
RS11	A toddler should only eat healthy food	55.19	0.51*	52.08	0.30*
Responsive		All child (n=149)		≥6mo (n=90)	
Satiety	*Behavior items*				
RP1	(Child) lets me know when s/he is full	96.03	1.00[b]	97.89	1.00[b]
RP2	(Child) lets me knows when s/he is hungry	94.7	1.00*	94.74	0.87*
RP3	I let (child) decide how much to eat	53.33	0.38*	57.44	0.43*
RP4	I pay attention when (child) seems to be telling me that s/he is full or hungry	98.67	0.52*	97.89	0.42*
RP5	I allow (child) to eat when s/he is hungry	93.68	0.43*	98.95	0.62*
	Belief Items				
RP6	Child knows when s/he is full	93.42	0.83*	93.68	0.91*
RP7	Child knows when hungry, needs to eat	92.21	0.87*	92.71	0.85*
Attention	*Behavior items*				
RP8	Talk to (child) to encourage to drink formula/breastmilk	62.76	1.00[b]	62.54	1.00[b]
RP9	Talk to (child) to encourage him/her to eat	62.58	0.92*	71.58	0.81*
RP10	Show (child) how to eat by taking a bite or pretending to[c]	-	-	78.95	0.52*
RP11	I will retry new foods if they are rejected at first[c]	-	-	73.69	0.63*
	Belief items				
RP12	Important to help or encourage a toddler to eat	90.91	0.56*	89.59	0.24*

Feeding Style	Item Description	Item Response %[a]	Factor Loading	Item Response %[a]	Factor Loading
Laissez-Faire		**All children (n=142)**		**≥6mo (n=93)**	
Indulgence[e]		All child (n=150)		≥6mo (n=115)	
Permissive	*Behavior items*				
ID1	Allow child watch TV while eating if s/he wants	30.00	0.86*	32.17	0.95*
ID2	Allow child to eat fast food if s/he wants[c]	-	-	18.56	0.68*
ID3	Allow child to drink sugared drinks/soda if s/he wants[c]	-	-	8.25	1.00*
ID4	Allow child to eat desserts/sweets if s/he wants[c]	-	-	24.27	1.09*
	Belief Items				
ID5	Toddlers should be allowed to watch TV while eating if they want	19.33	0.99*	20.00	1.01*
ID6	Toddlers should be allowed to eat fast food if they want	16.00	1.51*	15.65	1.31*
ID7	Toddlers should be allowed to drink sugared drinks/soda if they want	3.34	1.19*	2.61	1.19*
ID8	Toddlers should be allowed to eat desserts/sweets if they want	10.00	1.00[b]	11.31	1.00[b]
Coaxing	*Behavior items*				
ID9	Allow child watch TV while eating to make sure s/he gets enough	9.33	0.39*	11.30	0.55*
ID10	Allow child to eat fast food to make sure s/he gets enough[c]	-	-	6.31	0.78*
ID11	Allow child to drink sugared drinks/soda to make sure s/he gets enough[c]	-	-	3.13	0.88*
ID12	Allow child to eat desserts/sweets to make sure s/he gets enough[c]	-	-	6.86	0.78*
	-Belief Items				
ID13	Toddlers should be allowed to watch TV while eating to make sure they get enough	5.33	0.72*	6.09	0.67*
ID14	Toddlers should be allowed to eat fast food to make sure they get enough	6.67	0.93*	6.96	0.99*
ID15	Toddlers should be allowed to drink sugared drinks/soda to make sure they get enough	5.69	0.94*	2.61	0.93*
ID16	Toddlers should be allowed to eat desserts/sweets to make sure they get enough	3.33	1.00[b]	3.48	1.00[b]
Soothing	*Behavior items*				
ID17	Allow child watch tv while eating to keep him/her from crying	11.33	0.95*	12.17	0.81*
ID18	Allow child to eat fast food to keep him/her from crying[c]	-	-	3.06	1.09*

Feeding Style	Item Description	Item Response %[a]	Factor Loading	Item Response %[a]	Factor Loading
Laissez-Faire		**All children (n=142)**		**≥6mo (n=93)**	
ID19	Allow child to drink sugared drinks/soda to keep him/her from crying[c]	-	-	3.00	0.84*
ID20	Allow child to eat desserts/sweets to keep him/her from crying[c]	-	-	7.00	0.97*
	Belief Items				
ID21	Toddlers should be allowed to watch tv while eating to keep them from crying	8.00	0.86*	8.70	0.77*
ID22	Toddlers should be allowed to eat fast food to keep them from crying	2.66	1.19*	1.61	0.89*
ID23	Toddlers should be allowed to drink sugared drinks/soda to keep them from crying	4.00	0.99*	3.48	0.85*
ID24	Toddlers should be allowed to eat desserts/sweets to keep them from crying	2.67	1.00[b]	2.61	1.00[a]
Pampering	*Behavior items*				
ID25	Allow child watch tv while eating to keep him/her happy	17.33	0.44*	17.39	0.63*
ID26	Allow child to eat fast food to keep him/her happy[c]		-	3.23	0.57*
ID27	Allow child to drink sugared drinks/soda to keep him/her happy[c]		-	5.15	0.50*
ID28	Allow child to eat desserts/sweets to keep him/her happy[c]		-	9.00	0.60*
	Belief Items				
ID29	Toddlers should be allowed to watch tv while eating to keep them happy	8.00	0.83*	7.83	0.90*
ID30	Toddlers should be allowed to eat fast food to keep them happy	0.67	0.90*	9.57	0.92*
ID31	Toddlers should be allowed to drink sugared drinks/soda to keep them happy	4.00	0.82*	3.48	0.89*
ID32	Toddlers should be allowed to eat desserts/sweets to keep them happy	2.66	1.00[b]	2.61	1.00[b]

*p<0.05.

[a] Item response % indicates the proportion of mothers reporting practicing a behavior at least half of the time for behavioral items or agreeing or highly agreeing with a belief item.

[b] Parameter fixed at 1.0.

[c] Indicates items included only in analysis of children ≥6 mos (high % missing in younger children)

[d] Reverse coded- expected to relate negatively to feeding style.

[e] Measured in Infant Care sample only