



NIH PUBLIC ACCESS

Author Manuscript

Appetite. Author manuscript; available in PMC 2008 July 1.

Published in final edited form as:

Appetite. 2007 July ; 49(1): 131–140.

Assessment of infant feeding styles among low income African American mothers:

comparing reported and observed behaviors

Lisa M. Sacco^{a,1}, Margaret E. Bentley^a, Kenitra Carby-Shields^a, Judith B. Borja^a, and Barbara D. Goldman^b

*a*Carolina Population Center and Department of Nutrition, University of North Carolina at Chapel Hill, CB# 7461, 4115-C McGavran-Greenberg Hall, Chapel Hill, NC 27516, USA.

*b*FPG Child Development Institute, University of North Carolina at Chapel Hill, CB # 8180, 105 Smith Level Road, Chapel Hill, NC 27599, USA.

Abstract

This study's goal was to provide a detailed description of feeding styles adopted by a sample of African-American women in feeding their infants in North Carolina, and to examine the correspondence between reported and observed feeding styles. Cross-sectional semi-structured interview and videotaped data were gathered in the homes of 20 participating low-income mothers of infants aged 3-20 months. Feeding styles were characterized through a tailored coding scheme (the Infant Feeding Styles Video Coding Scheme, IFSVCS) applied to both interview and videotaped data. We found that the most frequent feeding styles identified for both interviews and videotaped observations was restrictive, but that mothers were roughly equally divided among predominantly controlling (pressuring or restrictive) and less controlling (laissez-faire or indulgent) styles across methods. However, for over 2/3 of the sample, there was a lack of correspondence between interview and video-taped feeding styles. This unique characterization and comparison of observed and reported infant feeding styles provides additional insights into parental feeding approaches among mothers of infants at high risk of obesity, and highlights the need for further study of feeding style assessment and potential impact on infant weight outcomes.

Keywords

Obesity; Infant feeding; African-American; Feeding styles; Parenting styles

Introduction

Parental feeding styles, or the parental attitudes, beliefs and/or practices related to child feeding, have recently received substantial attention in the literature (Faith et al., 2004b; Golan and Crow, 2004; Hughes et al., 2005) for the potential role they may play in the rising epidemic of childhood obesity (Hedley et al., 2004; Strauss and Pollack, 2001). Building on broader parenting style research, Costanzo and Woody (1979) initially suggested that parents may adopt domain-specific parenting styles in relation to different aspects of parenting, such as in

Corresponding author: lmohebati@yahoo.co.uk [Lisa M. Mohebati (Sacco)]

¹Present address: 53 Richmond Road, Brighton, E. Sussex, BN2 3RL, United Kingdom.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

relation to discipline, schooling or feeding. They also proposed that certain parenting styles adopted during feeding could be associated with the development of childhood obesity (Costanzo and Woody, 1979). This led the way for other researchers to begin further exploring the association between parenting styles and feeding outcomes (Birch et al., 1987; Cullen et al., 2001; Gable and Lutz, 2000). Researchers have generally limited their focus to aspects of the authoritarian parenting style during feeding (i.e., parental feeding control) and its association with child feeding behavior and weight status among small samples of predominantly white, middle-class, school-aged children (Birch and Fisher, 2000; Carper, Fisher, & Birch, 2000; Faith et al., 2004b; Faith et al., 2004a; Fisher and Birch, 1999; Klesges et al., 1991). A recent review of these studies by Faith et al. (Faith et al., 2004b) highlighted that it is particularly restrictive feeding strategies (rather than general parental control), which were most often found to be positively associated with increased child energy intake or body weight, although it was not clear if feeding styles play a causal role in the development of childhood obesity, or if those styles emerge as a consequence and then aggravate the problem. The generalizability of the findings to other ethnic groups is also unclear, since 2 larger multi-ethnic studies failed to find similar associations (Baughcum et al., 2001; Robinson et al., 2001). Because obesity has been found to be rising at an alarming rate among preschool-aged African-American and Hispanic children (Hedley et al., 2004; Strauss and Pollack, 2001), the need for further study in this area is evident, especially among younger children in minority populations. Several recent studies have addressed some of the previous studies' limitations by broadening their scope to include other feeding styles (Hughes et al., 2005; Patrick et al., 2005) and focusing on younger (Baughcum et al., 2001; Fisher et al., 2000; Taveras et al., 2004), and minority, low-income populations (Baughcum et al., 2001; Hughes et al., 2005; Patrick et al., 2005). Additionally, though previous research used different methods to assess parent feeding practices, such as in-home observations and questionnaires (Faith et al., 2004b), none, to our knowledge, has yet published any data on the correspondence between these two modes of assessment. One study did show that mothers report different responses related to feeding styles when assessed by questionnaire or semi-structured interview, raising a concern about the validity of questionnaire-type data (Jain et al., 2004). Another study indicated that parental report of increased restriction in child feeding was not reflected in their daughters' reports, generating further questions regarding the occurrence of reported behaviors in actual interactions (Carper, Fisher, & Birch, 2000).

The present study focuses on a broader range of feeding styles in a sample of low-income African-American infants, drawing on our own previous research and experience in infant feeding (Engle, Bentley, & Pelto, 2000; Ha et al., 2002; Lederman et al., 2004). A comparison of observed and reported feeding styles using qualitative methods provides rich detail on infant feeding styles in this population, within the framework of the parenting style classification proposed by Maccoby and Martin (1983).

The feeding style definitions employed in this study were chosen a priori, and formed the basis of all the analyses conducted in this paper. They are defined as follows: 1) **Responsive** (in which parents are responsive to the infant's hunger and satiety cues but control the quality of their infant's diet by providing an array of high-quality foods); 2) **Pressuring** (in which parents are not responsive to their infant's satiety signals and are intent on controlling the amount of food the child gets by increasing the amount consumed); 3) **Restrictive** (in which parents are not responsive to their infant's hunger signals and are intent on controlling the amount and quality of food the child gets by decreasing the amount consumed and/or not allowing the child to eat lower-quality foods); 4) **Indulgent** (in which parents are responsive to hunger and satiety cues but do not control or set limits in terms of the quantity or quality of food consumed); and 5) **Laissez-Faire** (in which parents are not responsive to hunger and satiety cues and do not control or set limits in terms of the quantity or quality of food consumed). These styles can also be thought of in terms of the general levels of parental control exerted during the feeding,

ranging from controlling (pressuring or restrictive) to less controlling (indulgent or laissez-faire).

The aims of the present study were: 1) to verify the presence of the 5 theoretical feeding styles, as defined above, in a population of low-income African-American mothers of infants under the age of two, using a specifically tailored coding scheme for both semi-structured interviews and video-taped observations; and 2) to examine the correspondence between reported (semi-structured interview) and observed (video-taped) predominant parent feeding style data collected in the families' homes.

Methods

Participants

The study was a cross-sectional examination of low-income, non-Hispanic, African-American women and their infants in 3 central North Carolina counties (Wake, Durham and Orange counties). Women were mainly recruited from WIC (Supplemental Services to Women, Infants and Children) clinics and later interviewed and video-taped in their homes. Participants included 20 non-Hispanic African-American women, 18-36 years of age, with healthy infants under the age of two. No exclusion criteria were applied related to feeding method. In total, 37 semi-structured interviews were collected, with 2 interviews for 17 of the participants and 1 for the remaining 3. One mother declined to be video-taped, bringing the total number of video-taped feeding interactions to 19.

Procedures

Recruitment and data collection protocols were approved by the Institutional Review Board at the University of North Carolina at Chapel Hill. A trained African-American female interviewer (KCS) recruited women at WIC clinics and from among participants of the Healthy Steps Project at the UNC Hospitals (Pediatric Clinics). Eligible women were sequentially contacted and invited to participate in the study according to the age of their infant, so that comparable numbers of infants were recruited in each age category (3 to 6, 7 to 10, 11 to 14 and 15 to 20 month olds) and a convenience sample of 20 women was achieved. A home visit was arranged with those willing to participate in the study and conducted by the same interviewer (KCS) from January to May of 2003. Each semi-structured interview lasted approximately 90 minutes and was tape-recorded and transcribed. Standard qualitative methods (Bernard, 1995) were employed to conduct the interviews, using guides based both on our previous exploration of infant feeding in a similar WIC-based African-American population (Bentley et al., 1999) as well as on further discussions of infant feeding styles in the literature. After the first interview was conducted, a second interview was arranged. Mothers were also video-taped feeding their infants following the interviews. Women were paid \$20 at the completion of each interview.

The Infant Feeding Style Video Coding Scheme (IFSVCS) and Classification Matrix were developed specifically for this study in order to evaluate both observed and reported feeding styles. These were based on the 5 styles defined in the introduction of the paper and are explained in further detail in the results section.

The IFSVCS Classification Matrix was used by one experienced researcher (LMS) to analyze both the video-taped observations and semi-structured interviews. This was done in a blinded manner, where the video-tapes were coded first, and 3 months later the semi-structured interview transcripts were coded with the coder being unaware of which interview corresponded to which video-tape. After analyses of the semi-structured and video-taped feeding style data, these were combined to analyze the agreement among them.

Statistical analysis

Non-parametric tests were used in the analyses because of the lack of normality in variable distributions. Correlations between subscale scores from the reported (interview) and observed (video-taped) methods were measured using Spearman's rho (Altman, 1991), and Kappa statistics were calculated to assess agreement in feeding style classification. Associations between feeding measures as dichotomous variables (i.e. pressuring vs. not pressuring) and participant characteristics were assessed using the Wilcoxon ranksum (Mann-Whitney) test for continuous variables and Fisher's exact test for categorical variables (Altman, 1991). The association between feeding styles as continuous measures (i.e. Pressuring z-score) and participant characteristics were assessed using Spearman's rho for continuous variables and the Wilcoxon ranksum for dichotomized categorical variables. All statistical analyses were performed using the Stata Statistical Program (StataCorp, 2001).

Development of the Infant Feeding Style Video Coding Scheme (IFSVCS) and Classification Matrix

A review of the literature and preliminary, systematic viewing of the video-taped data determined what aspects of the feeding style definitions would be most important in identifying the feeding styles. To begin, each video segment was observed at least 3 times and notes were made of the behaviors exemplifying the feeding styles. These behaviors were then organized by the researchers according to what aspect of the feeding styles they related to, since our limited sample size did not allow for the use of other methods such as factor or cluster analysis. In this way, behaviors such as "The caregiver persists in feeding when the infant consecutively rejects food" and "The caregiver tries to wake the infant up if s/he falls asleep" were combined into a grouping related to ignoring satiety cues, one of the elements of the pressuring feeding style. Limiting infant participation during the feeding by holding the child's arm down, or not allowing the infant to touch the bottle or spoon represented another grouping of observed behaviors characteristic of both the pressuring and restrictive feeding styles. The groupings (or subscales) fell into 2 general categories: 1) those related to the similarities among the styles, such as the way both the pressuring and restrictive styles limit infant participation; and 2) those related to the differences across similar feeding styles, such as pressuring caregivers' tendency to ignore satiety cues, whereas restrictive caregivers ignore hunger cues. In addition, not all subscales or groupings of behavior were related to the main similarities or differences across all feeding styles. As such, only a few subscales were associated with each style. The 8 resulting groupings or subscales are listed in the left-hand column of Table 2.

Semi-structured interview coding—For the interviews, the number of statements made by mothers under each of the subscale topics was coded as positive or negative and counted. The excerpts illustrated in Table 3 provide examples of positive and negative comments made by study participants for each one of the subscales, and are helpful in better understanding of the classification scheme. The number of negative or positive comments made by the women was then tallied and added up by subscale, yielding a positive, negative or neutral score (the latter, when the number of positive and negative statements was equal). Next, the scores of the component subscales were averaged for each feeding style, yielding a general score for the pressuring, restrictive, indulgent and laissez-faire feeding styles. These general feeding style scores were subsequently standardized by age group, and age-specific z-scores were obtained. For each mother, the lowest feeding style z-score obtained indicated her predominant feeding style (i.e. the lower a caregiver's pressuring z-score, the more pressuring that caregiver would be). Women whose feeding style z-scores were ≥ 1 standard deviation across all four feeding styles were considered responsive feeders (Table 4).

As an example of the entire classification procedure, Mom 015 made 3 positive comments and 7 negative comments related to her infant's hunger cues, and 8 positive comments and 5

negative comments related to allowing her infant to participate in the feeding throughout the interview. This yielded a score of -4 for the *Responsiveness to hunger cues* subscale and a 3 in the *Allowing infant participation in the feeding* subscale. These two scores were added together to obtain a restrictive score of -1, since these two are the component subscales for this style. Within the 11 to 14 month age group, this score is 1.49 standard deviations below the mean (or a z-score of -1.49), so she is slightly more restrictive than the average mother in this age group. However, her lowest score was for the pressuring style (z-score: -1.76), so her predominant feeding style was classified as pressuring (Table 4).

Video-tape coding—For the observed feeding styles, subscale scores revolved around the presence or absence of a set number of observed behaviors. The structure of the items was similar to that of the Nursing Child Assessment Feeding Scale (NCAFS) (Sumner and Spietz, 2004), which has been widely used and tested in evaluating maternal-infant interactions, and provides a comprehensive glossary of infant cues observable from birth (Sumner and Spietz, 2004). However, because the NCAFS was not designed to classify mothers according to the feeding styles it was not suitable for use in this study. On the other hand, the NCAFS items contributed to the initial pool of behaviors identified from the video-taped observations (especially those related to maternal responsiveness to hunger and satiety cues, as well as the unique classification of Subtle and Potent Disengagement Cues presented in the NCAST materials [Sumner, 1995; Sumner and Spietz, 2004]) which were later grouped into the component subscales for the new classification scheme. The items under each subscale were then tested and discussed by a group of 5 video coders, leading to the addition, modification or elimination of items. Only eight of the NCAFS items remained essentially unaltered in the new scheme, although these were rearranged under the new subscales. Twenty-three NCAFS items were modified to better capture the feeding style nuances and 23 new items were created to address other aspects of the feeding styles which did not feature in NCAFS items. The final scheme was a 54-item, 8-subscale form, with 4 of the subscales divided into separate caregiver and infant sections. Each item was worded in such a way that a “YES” answer would represent more desirable behaviors being observed during the feeding interaction (i.e. a responsive feeding style), whereas a “NO” would indicate tendencies towards other feeding styles. Samples of the items created for each of the subscales are listed in Table 5. Items which could not be observed because of mother or infant positioning or difficulties in hearing what was being said during the interaction were scored “MAYBE”. The instrument was then used to evaluate the video-taped recordings, and subscale scores were calculated by assigning a value of 1 to all “YES” answers, 0.5 to all “MAYBE” answers and 0 to all “NO” answers. For the purposes of this paper, however, only the caregiver portions of the coding scheme were analyzed. Scores were combined by component subscale (in the form of an average percent score) to yield a score for each feeding style. As shown in Table 6, these averaged scores were standardized by age group and women were classified as predominantly pressuring, restrictive, indulgent or laissez-faire according to their lowest z-score. Those with z-scores ≥ 1 for all feeding styles were classified as responsive.

Results

Study participants were 26.2 ± 5.7 (average \pm standard deviation) years old, were mostly single (65%) and the parent of more than 1 child (70%). Thirteen women (65%) reported yearly household incomes of \$30,000 or less and 12 (60%) indicated they were either employed, students or both (Table 1). The reported weights and heights for about one third of the women in this sample (35%) were consistent with obesity (Body Mass Index, or BMI ≥ 30 kg/m²). Another 35% were overweight (BMI: 25.0-29.9 kg/m²) and the remaining 30% were of a healthy reported weight (BMI: 18.5-24.9 kg/m²). The majority of infants were female (65%) and had been fed a mixed diet of human and non-human milks from early infancy (55%), with the later addition of infant cereal in the bottle (range: 1.5 to 5 months) and finger- and/or spoon-

fed solids (range: 3 to 6 months). Ten infants (50%) spent time being cared for away from their own homes, with an average of 43 ± 11 hours per week at day care or in another home.

Semi-structured interview feeding styles

A slightly greater proportion of women reported predominantly controlling feeding styles in the interviews (12 controlling, 7 non-controlling), and one reported a predominantly responsive feeding style. The largest proportion of women (12 women or 60%) were equally divided among pressuring and restrictive reported feeding styles (Table 4).

A few maternal and infant characteristics were also found to be significantly associated with some of the feeding styles.

Restriction was associated with fewer people in the household (Wilcoxon ranksum $p=0.04$ for restrictive vs. other feeding styles) and male infants (Wilcoxon ranksum $p=0.04$ for lower restrictive z-scores in male vs. female infants).

Caregivers reporting a predominantly pressuring feeding style had infants with higher gestational ages (Wilcoxon ranksum $p=0.04$ for pressuring vs. other feeding styles).

Being classified as predominantly laissez-faire or indulgent using the interview data was not significantly associated with any of the maternal or infant characteristics.

Video-taped feeding styles

Women's observed (video-taped) feeding styles were balanced between controlling and not controlling feeding styles (10 controlling and 9 less controlling). The most commonly observed feeding style was restrictive (7 women) (Table 6).

Only a handful of significant associations were evident among maternal and infant characteristics and observed feeding styles.

No significant associations were evident between the restrictive feeding style and any of the other variables.

Maternal report of part or full-time work/study was associated with more pressuring behavior being observed during the feeding interaction (Wilcoxon ranksum $p=0.02$ for lower pressuring z-scores in caregivers who worked/studied than for those who did not).

In addition, the greater the number of hours spent by the infant in another home, the more laissez-faire the caregiver was observed to be (number of hours and laissez-faire z-score, Spearman's $\rho = -0.51$, $p=0.02$).

Lastly, higher reported incomes were associated with less indulgent behavior being adopted during the video-taped feeding (income and indulgent z-score, Spearman's $\rho = 0.65$, $p=0.00$).

Consistency of observed (video-taped) and reported (interview) feeding styles

Agreement between feeding style assessment methods was low at 26.3% (Table 7) and was not statistically different from the agreement which would be obtained by chance alone. Agreement existed only between 5 of 19 video-taped & interview feeding styles, 3 of whom were predominantly restrictive, 1 of whom was predominantly pressuring and 1 of whom was predominantly laissez-faire.

When raw subscale scores were compared across methods by mother, correlations were also notably absent. The one exception was the portion size subscale, where a Spearman correlation coefficient of 0.47 ($p=0.04$) was noted between the observed and reported subscale scores.

Women whose reported and observed predominant feeding styles were found to be in agreement were found to report significantly fewer years of schooling (Wilcoxon ranksum $p=0.03$ for women whose styles were in agreement vs. those who were not) and lower infant birth length percentiles (Wilcoxon ranksum $p=0.026$ for women whose styles were in agreement vs. those who were not).

Discussion

Our findings demonstrated that: 1) Five feeding styles defined a priori were distinguishable even among infants 3 to 20 months of age, using a unique coding scheme; 2) There was very limited correspondence across reported (interview) and observed (video-taped) feeding styles in this sample; and 3) The presence of less controlling feeding styles (i.e. indulgent and laissez-faire) was evident in this population and highlights the need for further investigation of the impact of these styles on infant and child overweight, especially among minority populations.

Our first finding, the ability to distinguish infant feeding styles previously related to obesity in older children (Faith et al., 2004b; Hughes et al., 2005; Patrick et al., 2005) in infancy, is of special note. This is not only because of the possibilities it offers in terms of the prevention of less than ideal feeding styles with potentially negative impacts later in childhood, but also to the possible effects these may have on growth and weight gain during infancy itself (Farrow & Blissett, 2006). This is especially relevant in light of recent literature in which consistent evidence is provided of infant growth as a risk factor for later obesity in childhood (Reilly et al., 2005), adolescence and later adulthood (Baird et al., 2005).

Our second main finding, poor agreement between observed (video-taped) and reported (interview) infant feeding styles, has important implications for the interpretation of data on reported feeding styles. Though previous literature provided some evidence of the lack of correspondence between questionnaire and semi-structured interview feeding style data (Jain et al., 2004), as well as discordance between parental and child reports of restrictive feeding styles (Carper, Fisher, & Birch, 2000), to our knowledge, ours is the first to contrast these modes of feeding style assessment. It must be noted, however, that in a recent review, the proportion of studies reporting negative, positive or null associations between parental feeding style and child outcome did not significantly differ across participant-report and observational studies (Faith et al., 2004b). Our own data suggest some characteristics may be linked with better agreement between observed and reported feeding styles such as lower maternal education, although these associations must be interpreted with caution because of our small sample size and the possibility of spurious correlations.

Data on observed feeding styles provides useful information on actual behavior and adds to the caregiver's assessment of what s/he generally perceives s/he does or tries to do during feeding interactions. It is not without limitations, however, and reactivity and masking of true behavior due to the presence of a video-camera in the home is a possibility. In our study we sought to address this by conducting two interviews and establishing good rapport with the mother prior to videotaping. In addition, the presence of a hungry infant in familiar surroundings provides a setting conducive for a caregiver to act as s/he normally would. Infant behavior during the meal also likely affects how caregivers respond and thus contributes to better capturing the true dynamics of the feeding interaction (Sumner and Spietz, 2004).

Reported data have the advantages of convenience, reduced cost, and potential ability to capture eating patterns across longer periods of time, as opposed to what may be temporary styles

captured during a single observed meal (Faith et al., 2004b). On the other hand, mothers have been shown to misinterpret questions in feeding questionnaires (Jain et al., 2004), and even semi-structured interviews such as were used in this study may lead to the misclassification of a mother's predominant feeding style, given potential differences in the nature and number of probes used during the interview process.

Thus, the need for careful assessment of the best means of identifying feeding styles and their impact on child feeding and weight outcomes highlighted by others (Faith et al., 2004b) is further underscored by these findings.

Our third finding, regarding the prevalence of less controlling feeding styles in this population, is related to potential feeding style differences across different ethnicities. African American mothers have been previously found to report more pressure to eat and restrictive (i.e. controlling) practices than their White counterparts, although they may not necessarily be translating these reports into action (Spruijt-Metz et al., 2006). Another study of self-reported feeding behavior in low-income minority preschoolers found that a majority (35%) of African-American caregivers was in line with an authoritarian (i.e. controlling) feeding style, although considerable proportions also reported the less-controlling styles including indulgent (30%) and uninvolved (equivalent to our laissez-faire style -- 22%) (Hughes et al., 2005). Our results were similar to these, with slightly greater proportion of women reporting pressuring and restrictive feeding styles, followed by the laissez-faire and indulgent feeding styles. On observation, though, more of our study participants were classified as predominantly restrictive, followed by indulgent, laissez-faire and pressuring. Because of the lack of congruence across methods, we cannot speculate about these findings, but rather underscore the importance of examining the impact of less controlling feeding styles on long-term energy balance in ethnically diverse populations of children, both through participant-report and observational methods (Faith et al., 2004b). This is of particular relevance given the relatively small number of studies examining the impact of less controlling feeding styles on childhood obesity (Hughes et al., 2005; Wardle et al., 2002), and represents a departure from the traditional focus on less controlling behaviors as separate entities impacting childhood overweight (such as has been the case with television viewing (Crespo et al., 2001; Gortmaker et al., 1996; Gortmaker et al., 1999; Reilly et al., 2005), or the consumption of sugar-sweetened drinks (Ludwig, Peterson, & Gortmaker, 2001)). These are prevalent behaviors, but there is still much to learn about what other feeding behaviors these may be associated with and how these, as a whole, are associated with child overweight. Additionally, the potential association between ethnicity and feeding control may also be reflecting in part a link between maternal overweight, poverty and less controlling reported feeding strategies (Fisher and Birch, 1999; Jain et al., 2001; Wardle et al., 2002), since women from minority backgrounds are more likely to both be overweight (Ogden et al., 2006) and of lower socioeconomic status (Baltrus et al., 2005). Our own sample of African-American women provides some evidence in this regard, with those who shared their homes with a larger number of people being significantly less likely to report the adoption of restrictive (i.e. controlling) feeding styles, and those with lower incomes demonstrating more indulgent (i.e. less controlling) behavior during feeding interactions.

The small sample size of this study was a limiting factor both in the manner the subscales were chosen (precluding the use of such methods as cluster or factor analysis) as well as in further establishing the reliability of the scale to rate video-taped feeding interactions. The classification matrix and scale are unique instruments specifically tailored for the evaluation of feeding styles at these very young ages, and draw upon a firm theoretical basis of considerable previous research (Birch et al., 2001; Engle, Bentley, & Pelto, 2000; Lederman et al., 2004), qualitative data analysis (Bentley et al., 1999) and the widely-used NCAST feeding scale (Sumner and Spietz, 2004). They also offer the opportunity to examine the effects of both

controlling and less controlling reported and observed feeding styles on infant outcomes from a very young age.

Additional analyses with a larger sample size are currently being conducted to further refine, develop and validate this scale using data collected in our ongoing longitudinal study on Infant Care, Feeding, and the Risk of Obesity in a similar low-income African-American population (Lederman et al., 2004).

Conclusions

In this paper we provide the first characterization of the 5 feeding styles previously associated with childhood obesity in pre-school and school-aged children in a sample of low-income African-American mothers of infants 3 to 20 months of age. We additionally present a rare view of both reported and observed feeding styles among these women and draw attention to the very limited correspondence among observed and reported feeding styles. Our findings emphasize that important issues related to feeding styles may be overlooked if further research is not undertaken to clarify how best to assess the potential impact they may have on child weight outcomes in the long run, including actual behaviors not being captured by reported behaviors, or behaviors captured during a single feeding observation not reflecting feeding styles adopted over a period of time. The results from our study further support continued focus on less controlling feeding styles and their potential obesogenic role, and provide new instruments to do so using semi-structured interview and observational data. Finally, our findings support infant feeding styles as a potential target for early prevention efforts in the battle against the future risk of obesity.

Acknowledgements

We are grateful to all participating mothers and babies. This research was supported by grant R01 HD42219-02 from the National Institutes of Health/NICHD, and fellowships DK07686-12 (03/2004-02/2005) from the Department of Health and Human Services Public Health Services and CA72319-08 (03/2005-02/2006) from the National Research Service Award.

References

- Altman, DG. Practical statistics for medical research. Chapman & Hall; London, UK: 1991.
- Baird J, Fisher D, Lucas P, Kleijnen J, Roberts H, Law C. Being big or growing fast: systematic review of size and growth in infancy and later obesity. *British Medical Journal* 2005;331(7522):929. [PubMed: 16227306]
- Baltrus PT, Lynch JW, Everson-Rose S, Raghunathan TE, Kaplan GA. Race/ethnicity, life-course socioeconomic position, and body weight trajectories over 34 years: the Alameda County Study. *American Journal of Public Health* 2005;95(9):1595–1601. [PubMed: 16051936]
- Baughcum AE, Powers SW, Johnson SB, Chamberlin LA, Deeks CM, Jain A, Whitaker RC. Maternal feeding practices and beliefs and their relationships to overweight in early childhood. *Journal of Developmental and Behavioral Pediatrics* 2001;22(6):391–408. [PubMed: 11773804]
- Bentley M, Gavin L, Black MM, Teti L. Infant feeding practices of low-income, African-American, adolescent mothers: an ecological, multigenerational perspective. *Social Science & Medicine* 1999;49(8):1085–1100. [PubMed: 10475672]
- Bernard, HR. Research methods in anthropology: qualitative and quantitative approaches. AltaMira Press; Walnut Creek, CA: 1995. Unstructured and Semistructured Interviewing; p. 208-236.
- Birch LL, Fisher JO. Mothers' child-feeding practices influence daughters' eating and weight. *American Journal of Clinical Nutrition* 2000;71(5):1054–1061. [PubMed: 10799366]
- Birch LL, Fisher JO, Grimm-Thomas K, Markey CN, Sawyer R, Johnson SL. Confirmatory factor analysis of the Child Feeding Questionnaire: a measure of parental attitudes, beliefs and practices about child feeding and obesity proneness. *Appetite* 2001;36(3):201–210. [PubMed: 11358344]

- Birch LL, McPhee L, Shoba BC, Steinberg L, Krehbiel R. Clean up your plate: Effects of child feeding practices on the conditioning of meal size. *Learning and Motivation* 1987;18:301–317.
- Carper JL, Fisher JO, Birch LL. Young girls' emerging dietary restraint and disinhibition are related to parental control in child feeding. *Appetite* 2000;35(2):121–129. [PubMed: 10986105]
- Costanzo PR, Woody EZ. Externality as a function of obesity in children: pervasive style or eating-specific attribute? *Journal of Personality and Social Psychology* 1979;37(12):2286–2296. [PubMed: 529014]
- Crespo CJ, Smit E, Troiano RP, Bartlett SJ, Macera CA, Andersen RE. Television watching, energy intake, and obesity in US children: results from the third National Health and Nutrition Examination Survey, 1988-1994. *Archives of Pediatrics & Adolescent Medicine* 2001;155(3):360–365. [PubMed: 11231802]
- Cullen KW, Baranowski T, Rittenberry L, Cosart C, Hebert D, de Moor C. Child-reported family and peer influences on fruit, juice and vegetable consumption: reliability and validity of measures. *Health Education Research* 2001;16(2):187–200. [PubMed: 11345661]
- Engle PL, Bentley M, Pelto G. The role of care in nutrition programmes: current research and a research agenda. *The Proceedings of the Nutrition Society* 2000;59(1):25–35. [PubMed: 10828171]
- Faith MS, Berkowitz RI, Stallings VA, Kerns J, Storey M, Stunkard AJ. Parental feeding attitudes and styles and child body mass index: prospective analysis of a gene-environment interaction. *Pediatrics* 2004a;114(4):e429–e436. [PubMed: 15466068]
- Faith MS, Scanlon KS, Birch LL, Francis LA, Sherry B. Parent-child feeding strategies and their relationships to child eating and weight status. *Obesity Research* 2004b;12(11):1711–1722. [PubMed: 15601964]
- Farrow C, Blissett J. Does maternal control during feeding moderate early infant weight gain? *Pediatrics* 2006;118(2):e293–e298. [PubMed: 16882774]
- Fisher JO, Birch LL. Restricting access to palatable foods affects children's behavioral response, food selection, and intake. *American Journal of Clinical Nutrition* 1999;69(6):1264–1272. [PubMed: 10357749]
- Fisher JO, Birch LL, Smiciklas-Wright H, Picciano MF. Breast-feeding through the first year predicts maternal control in feeding and subsequent toddler energy intakes. *Journal of the American Dietetic Association* 2000;100(6):641–646. [PubMed: 10863566]
- Gable S, Lutz S. Household, parent and child contributions to childhood obesity. *Family Relationships* 2000;49:293–300.
- Golan M, Crow S. Parents are key players in the prevention and treatment of weight-related problems. *Nutrition Reviews* 2004;62(1):39–50. [PubMed: 14995056]
- Gortmaker SL, Must A, Sobol AM, Peterson K, Colditz GA, Dietz WH. Television viewing as a cause of increasing obesity among children in the United States, 1986-1990. *Archives of Pediatrics & Adolescent Medicine* 1996;150(4):356–362. [PubMed: 8634729]
- Gortmaker SL, Peterson K, Wiecha J, Sobol AM, Dixit S, Fox MK, Laird N. Reducing obesity via a school-based interdisciplinary intervention among youth: Planet Health. *Archives of Pediatrics & Adolescent Medicine* 1999;153(4):409–418. [PubMed: 10201726]
- Ha PB, Bentley ME, Pachon H, Sripaipan T, Caulfield LE, Marsh DR, Schroeder DG. Caregiver styles of feeding and child acceptance of food in rural Viet Nam. *Food and Nutrition Bulletin* 2002;23(4 suppl):95–100. [PubMed: 12503237]
- Hedley AA, Ogden CL, Johnson CL, Carroll MD, Curtin LR, Flegal KM. Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. *Journal of the American Medical Association* 2004;291(23):2847–2850. [PubMed: 15199035]
- Hughes SO, Power TG, Fisher JO, Mueller S, Nicklas TA. Revisiting a neglected construct: parenting styles in a child-feeding context. *Appetite* 2005;44(1):83–92. [PubMed: 15604035]
- Jain A, Sherman SN, Chamberlin LA, Carter Y, Powers SA, Whitaker RC. Why don't low-income mothers worry about their preschoolers being overweight? *Pediatrics* 2001;107(5):1138–1146. [PubMed: 11331699]
- Jain A, Sherman SN, Chamberlin LA, Whitaker RC. Mothers misunderstand questions on a feeding questionnaire. *Appetite* 2004;42(3):249–254. [PubMed: 15183915]

- Klesges RC, Stein RJ, Eck LH, Isbell TR, Klesges LM. Parental influence on food selection in young children and its relationships to childhood obesity. *American Journal of Clinical Nutrition* 1991;53(4):859–864. [PubMed: 2008864]
- Lederman SA, Akabas SR, Moore BJ, Bentley ME, Devaney B, Gillman MW, Kramer MS, Mennella JA, Ness A, Wardle J. Summary of the Presentations at the Conference on Preventing Childhood Obesity, December 8, 2003. *Pediatrics* 2004;114(4):1146–1173.
- Ludwig DS, Peterson KE, Gortmaker SL. Relation between consumption of sugar-sweetened drinks and childhood obesity: a prospective, observational analysis. *Lancet* 2001;357(9255):505–508. [PubMed: 11229668]
- Maccoby, E.; Martin, J. Socialization in the context of the family: Parent-child interaction. In: Mussen, PH., editor. *Handbook of child psychology*. Wiley; New York: 1983. p. 1-101.
- Ogden CL, Carroll MD, Curtin LR, McDowell MA, Tabak CJ, Flegal KM. Prevalence of overweight and obesity in the United States, 1999-2004. *Journal of the American Medical Association* 2006;295(13):1549–1555. [PubMed: 16595758]
- Patrick H, Nicklas TA, Hughes SO, Morales M. The benefits of authoritative feeding style: caregiver feeding styles and children's food consumption patterns. *Appetite* 2005;44(2):243–249. [PubMed: 15808898]
- Reilly JJ, Armstrong J, Dorosty AR, Emmett PM, Ness A, Rogers I, Steer C, Sherriff A. Early life risk factors for obesity in childhood: cohort study. *British Medical Journal* 2005;330(7504):1357–1363. [PubMed: 15908441]
- Robinson TN, Kiernan M, Matheson DM, Haydel KF. Is parental control over children's eating associated with childhood obesity? Results from a population-based sample of third graders. *Obesity Research* 2001;9(5):306–312. [PubMed: 11346672]
- Spruijt-Metz D, Li C, Cohen E, Birch L, Goran MI. Longitudinal influence of mother's child-feeding practices on adiposity in children. *Journal of Pediatrics* 2006;148(3):314–320. [PubMed: 16615957]
- StataCorp. *Stata Statistical Software: Release 7.0*. Stata Corporation; College Station, TX: 2001.
- Strauss RS, Pollack MJ. Epidemic increase in childhood overweight, 1986-1998. *Journal of the American Medical Association* 2001;286(22):2845–2848. [PubMed: 11735760]
- Sumner G. Keys to caregiving: A new NCAST program for health care providers and parents of newborns. *Zero to Three* 1995;16(1):33–35.
- Sumner, G.; Spietz, A. *NCAST Caregiver/Parent-Child Interaction Feeding Manual*. NCAST Publications, University of Washington, School of Nursing; Seattle: 2004.
- Taveras EM, Scanlon KS, Birch L, Rifas-Shiman SL, Rich-Edwards JW, Gillman MW. Association of breastfeeding with maternal control of infant feeding at age 1 year. *Pediatrics* 2004;114(5):e577–e583. [PubMed: 15492358]
- Wardle J, Sanderson S, Guthrie CA, Rapoport L, Plomin R. Parental feeding style and the inter-generational transmission of obesity risk. *Obesity Research* 2002;10(6):453–462. [PubMed: 12055321]

Table 1
Demographic characteristics of mothers participating in the study.

Mean maternal age, yrs (\pm SD)	26.2 (\pm 5.7)
Parity, n (%)	
1	6 (30%)
>1	14 (70%)
Education, n (%)	
High school graduate or less	13 (65%)
Some college	4 (20%)
College graduate or some postgraduate	3 (15%)
Income, n (%)	
<\$10,000	4 (20%)
\$10,000 to \$20,000	5 (25%)
\$21,000 to \$30,000	4 (20%)
\$31,000 to \$40,000	5 (25%)
\$41,000 to \$50,000	2 (10%)
Marital status, n (%)	
Married	5 (25%)
Separated	2 (10%)
Single	13 (65%)
Work or study outside the home, n (%)	
Yes	12 (60%)
No	8 (40%)

Maternal feeding-style classification schema for semi-structured interviews and video-taped observations: subscales (left-most column) and component subscales (shaded areas corresponding to subscales which determine scores for each feeding style). Symbols indicate whether caregivers adopts (✓) or do not adopt (X) ideal behaviors related to each of the subscales, and the relevance of the subscale to the main similarities or differences across feeding styles (with “-” denoting no relevance).

Table 2

Subscales	Responsive	Pressuring	Restrictive	Laissez-Faire	Indulgent
Responsiveness to hunger cues	✓	-	X	-	-
Responsiveness to satiety cues	✓	X	-	-	-
Portion Size	✓	X	-	-	-
Allowing infant participation	✓	X	X	-	-
Attention to the infant	✓	-	-	X	-
Encouragement to eat	✓	-	-	X	-
Food quality	✓	-	-	X	X
Discipline	✓	-	-	X	X

Table 3

Examples of positive and negative statements made by the women in the semi-structured interviews for each of the subscale topics.

Subscale	Positive statement	Negative statement
Hunger cues	"Because she would cry, cry, cry like she wanted more to eat. She would suck her fingers a lot. You know, like suck her fingers. I'd give her the pacifier, she spit it out, spit it out. And so, it was either feed her more food or give her more formula...!"	"But after he ate a whole pack of noodles and he still acts like he wants more, then there's no more. He just can't have any more."
Satiety cues	"She'll shake her head, "no," she'll be like and she'll like turn her head so you can't even try to offer her something. She'll close her mouth and spit it out, or when she gets full she'll just either spit it out of her mouth or she'll just push it aside or throw it on the floor."	"Cause, like I said, babies keep on going. They don't know when to stop. So it's up to the parents to make that decision when it's time for them to stop eating or not."
Infant participation	"She's pretty good about using forks. (...) She does [eat], like, cereal and milk, she does [eat] regular vegetables like regular dinner food. She's pretty much on that. And then sometimes she finds it's easier to eat with her fingers. She might pick it up and put it in her mouth like that."	"I'm kind of a perfectionist or an idealist kind of by nature or whatever. So, when he picks up the spoon and he doesn't exactly make it to his mouth or whatever or like he wants to play with it instead or whatever, I don't know, it kind of gets me. And so, you know, I'll try to do it for him or whatever."
Attention	"I: And do you watch television when you guys are eating? R: No. (...) It distracts them and then I like to try to talk to them at that time to see how their day went (...). And the TV just slows them down (...). And they're not eating, they're concentrating on the TV."	"I: How many meals do you usually eat with the TV on? R: Hm! Every one, probably? [Laughing] All the meals. I know that's supposed to like what retard the conversation. We're talking with the TV on and eating meals. We're not just watching it."
Portion size	"I don't know how much a baby spoon is. I put like maybe thirty spoonfuls from the little jar in a bowl."	"I: OK. And when she's feeding herself, does she use a baby spoon or a regular spoon? R: Regular. I think a baby spoon is a waste of money. I: Why do you say that? R: That little thing! It doesn't pick up anything! And then by the time you put the spoon down, she ate it already!"
Food quality	"I don't like her to have candy; (...) - I won't give her like Kool-Aid, things like that. I try to give her like fruits and vegetables and healthy things, (...) I don't really ever give her fast foods, maybe chicken nuggets sometimes, but not like all the French fries and all that junk."	"If I cook chicken and he won't eat the chicken, and I cook the French fries and he eats the French fries, I think it's better to give him the French fries than not give him anything to eat if that's what he wants to eat. (...) I buy what they like to eat. And they go in the grocery store and they see things they want and they pick it up. They'll point at it (...). Cookies."
Encouragement	"And then I helped to put the spoon in her hand and guide it, show her how to do it, say "OK, like do it like this" or she might watch me eat so she can see how I do it. And when I use the fork, because I stick it in her food, I hold it in her hand like this and I'm sticking the food into it, I help her get it on and just guide it in so she knows, stuff like that."	"I don't think Junior needs help to eat. When he sits down, if he can sit there and feed himself his food, why interfere? It's part of being independent. (...) I'm not gonna bother him or sit there and try to help him eat if he can sit there and do it himself. (...) If he drops something on his little thing, he'll pick it up. He'll get it [laughter]."
Discipline	"He (infant) usually eats with us (...) it encourages good behavior, you know, as far as not eating on the run, you know, establishing eating habits as far as eating at home, and not eating just outside on the run."	"Lunchtime I let them sit over there, or walk around because they just seem to like walking around. I don't know, inside I'm like "no, they're supposed to sit and eat", but they want to walk, they want to play, and they want to stop and come back (...)."

Table 4
Age-adjusted z-scores by feeding style, and predominant feeding style (lowest age-adjusted z-score) from semi-structured interviews.

Age group Id number	Predominant Feeding Style		
	Pressuring	Restrictive	Indulgent
3 to 6 mos.			
001	-1.64	-0.83	-1.07
002	-0.07	-1.00	0.15
003	0.10	1.50	1.61
004	0.80	0.17	-0.34
005	0.80	0.17	-0.34
7 to 10 mos.			
006	-0.47	0.10	-0.05
007	-0.63	-0.79	0.75
008	-1.30	-0.49	-0.85
009	1.52	1.87	1.07
010	0.52	-0.79	0.59
011	0.36	0.10	-1.49
11 to 14 mos.			
012	0.57	-0.18	-0.04
013	0.15	-0.18	0.99
014	0.47	0.92	-1.59
015	-1.76	-1.49	0.68
016	0.57	0.92	-0.04
15 to 20 mos.			
017	1.39	0.86	1.00
018	-0.20	-1.43	0.24
019	-0.99	0.48	0.14
020	-0.20	0.10	-1.38

Table 5

Sample items from each of the Infant Feeding Styles Video Coding Scheme (IFSVCS) subscales.

Subscale	Sample items
Responsiveness to hunger cues	Caregiver does not terminate the feeding if the child is still exhibiting hunger cues
Responsiveness to satiety cues	Caregiver does not attempt to wake the infant or offer more food if he/she appears to be falling asleep
Portion Size	Caregiver uses only infant-size utensils to feed the child
Encouragement to eat	Caregiver offers the same food at least one additional time after infant has refused it
Allowing infant participation	Caregiver encourages and/or allows infant to explore food or feeding utensil during all segments of the feeding
Attention to the infant	Television is not on for more than 30 seconds once feeding has begun
Food quality	Caregiver does not offer or promise high-fat/ high-sugar palatable foods to the infant
Discipline	Caregiver ensures that the infant remains relatively stationary during the feeding (not running, walking or crawling around while eating).

Age-adjusted z-scores by feeding style, and predominant feeding style (lowest age-adjusted z-score) from video-taped observations.

Table 6

Age group Id number	Predominant Feeding Style		
	Pressuring	Restrictive	Laissez-Faire
3 to 6 mos.			
001			No video
002	-1.03	0.00	Laissez-Faire
003	1.32	0.00	Indulgent
004	-0.44	-1.23	Restrictive
005	0.15	1.23	Pressuring
7 to 10 mos.			
006	-1.27	-1.26	Pressuring
007	1.69	1.65	Laissez-Faire
008	0.42	-0.10	Restrictive
009	0.00	0.48	Indulgent
010	-0.42	-0.68	Restrictive
011	-0.42	-0.10	Pressuring
11 to 14 mos.			
012	-0.37	-0.61	Restrictive
013	1.48	0.92	Laissez-Faire
014	0.09	0.15	Indulgent
015	-1.29	-1.38	Restrictive
016	0.09	0.92	Laissez-Faire
15 to 20 mos.			
017	0.81	0.83	Indulgent
018	-0.75	-1.48	Restrictive
019	0.81	0.83	Indulgent
020	0.50	0.37	Restrictive

Table 7

Predominant feeding style by classification mode. Shaded boxes indicate agreement among reported and observed predominant feeding styles.

VIDEO-TAPE	SEMI-STRUCTURED INTERVIEWS	Restrictive	Laissez-Faire	Indulgent	Responsive
Pressuring	006 _{7-10 mos.}		005 _{3-6 mos.}	011 _{7-10 mos.}	
Restrictive	008 _{7-10 mos.} , 015 _{11-14 mos.}	018 _{15-20 mos.} , 010 _{7-10 mos.} , 012 _{11-14 mos.}		004 _{3-6 mos.} , 020 _{15-20 mos.}	
Laissez-faire		007 _{7-10 mos.} , 002 _{3-6 mos.} , 013 _{11-14 mos.}	016 _{11-14 mos.}		
Indulgent	003 _{3-6 mos.} , 019 _{15-20 mos.}		014 _{11-14 mos.} , 017 _{15-20 mos.}		009 _{7-10 mos.}
No video available	001 _{3-6 mos.}				