

Feeding Sensitivity at 3-Months Predicts Parental Feeding Style at 3-Years

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Abstract: *Objective:* To examine the association between maternal responsive feeding in infancy and later parental feeding style in childhood, with a secondary aim of linking parenting style to child weight status

Design: Short-term, longitudinal study

Subjects: 65 mother-infant pairs, followed from 3-months to 3-years

Methods: Mother-child dyads were seen at enrollment, observed at home when the infant was 3-months-old, and at home again when the infant turned 2-years of age. When the child reached 3-years, mothers self-reported their feeding style.

Results: Responsive maternal feeding at 3-months predicted an authoritative feeding style at 3-years, and the authoritative feeding style was associated with a healthier weight status.

Conclusion: Responsive feeding in infancy may serve as the foundation for responsive feeding in childhood and may serve to help in reducing obesity risk

Keywords: Feeding style, parenting style, responsive feeding, authoritative parenting, BMI.

While the health risks for adults associated with obesity are well documented and engender sizeable health care costs, the incidence of overweight in children is no less serious a concern, since one in four preschool-age children in the US and certain European countries is presently affected. Among 6- to 11-year-olds, the most recent prevalence estimate for overweight children in the US is approximately 33 percent, with an estimate of 25 percent for low-income children ages 2 to 5 years old [1]. Research shows that children who are obese are at higher risk for developing hypertension, high cholesterol, respiratory ailments, orthopedic problems, type 2 diabetes, and depression [2]. Previous studies have identified numerous risk factors to be associated with early obesity, among them high energy intake, low activity or energy expenditure, maternal overweight, rapid early infant growth, and overly controlling maternal feeding styles [3]. To be sure, parents exert their influence on child weight by virtue of genetics, but their providing food, setting mealtimes, and in the first years, actually feeding their offspring, should not be discounted [4]. Indeed, parental feeding style has garnered particular interest with respect to identifying the causes of childhood obesity.

To this point, a number of instruments are now available that allow for caregiver self-reports as to how she approaches feeding her young child [5-9]. While early efforts largely focused on caregiver control as expressed through restricting children's intake or pressuring them to eat (see [10] for a review), more recent reports have used the feeding context as a window to parenting style in general (see [11] for a review). For example, parental restricting and pressuring has been shown to predict the authoritarian parenting style [12]. The authoritarian style—indeed, the most controlling—reflects high demandingness on the part of the parent, but also low responsiveness to the child's needs [13]. Three other parenting styles have been formulated, namely, authoritative (high demandingness and high responsiveness), indulgent (low demandingness and high responsiveness), and uninvolved (low demandingness and low responsiveness) [14]. The authoritative parenting style is acknowledged to be the best in terms of the child's developmental outcomes [15], and current research seems to support its being the most protective style in reducing obesity risk [11].

As sizable as the research in this area has become, however, it is remiss in ignoring the role of responsive parenting during the child first years, that is, how the caregiver handles feeding during infancy. Though not considered a form of parenting style, responsive feeding is nonetheless an index of responsive parenting [16], with *nonresponsive* feeding having

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demonstrated an association with child overweight [17]. Fortunately, instruments that can measure feeding behavior during infancy are also available, both as self-report [5, 18] and notably, via observation (see [19] for a review).

The purpose of the present study was to explore the association between maternal responsive feeding in infancy and later parental feeding style in childhood, with a secondary aim of linking parenting style to child weight status. To this end, maternal behavior during a feeding interaction was observed at 3-months, and mothers later self-reported their feeding behaviors at 3-years, with the latter used to categorize them along the lines of recognized parental feeding styles.

METHOD

The research protocol was approved by the Rutgers University Institutional Review Board. As part of the Rutgers Infant Nutrition and Growth (RING) Project, mothers were recruited at their initial visit to the local WIC Center. WIC is the Special Supplemental Nutrition Program for Women, Infants, and Children [20] that provides funds to states for supplemental foods and nutrition education for low-income pregnant and postpartum women, and to their infants and children up to age five who are deemed to be at nutritional risk. The cooperating center serves a largely minority population. The RING Project was designed to explore risk factors for early obesity, hence only mothers who indicated they were formula-feeding their infants were approached to participate in the study. Following their enrollment, the mothers were queried as to their race/ethnicity and provided some demographic information and details concerning their infants' birth. All the participants were non-white, specifically Black, Hispanic, or other Latino, with Spanish translation provided by the recruiter where necessary. The present sample consists of 65 mother-child pairs who were seen at enrollment, at home when the infant was 3-months-old, and at home again when the infant turned 2-years of age. When the child reached 3-years, mothers completed a questionnaire.

Measures

When the infants reached 3-months of age, two research assistants (one Spanish speaking as needed) visited the family's home. Infants were measured and weighed twice using a pediatric scale (Tanita™ BD-585) and mother-infant pairs were observed using the *Nursing Child Assessment Feeding Scale* (hereafter,

CAFS)—a 76-item rating scale of mother and infant interactive behaviors coded during a feeding episode. The CAFS is well-validated and suitable for infants from birth–12 months [21]. When the infants reached 2-years of age, two research assistants returned to the families' homes, with the infants again being measured and weighed with the pediatric scale. When the child was 3-years-old, mothers were sent the *Caregiver's Feeding Style Questionnaire* (CFSQ) to complete and return. The CFSQ is a 31-item instrument that taps the physical and verbal strategies a mother uses to get her child to eat, and reflects the dominant parental feeding style. The CFSQ was developed for and validated with parents of 3–5-year-old children [8].

Scoring

CAFS

For the CAFS, subscale scores for the mother are provided for her Sensitivity to Cues, Response to Children's Distress, Social-Emotional Growth Fostering, and Cognitive Growth Fostering, and a Caregiver Total is then computed. A higher Caregiver Total Score therefore denotes a mother who is higher in sensitivity and responsiveness to her infant in the context of feeding.

CFSQ

For the CFSQ, subscales are computed for the dimensions of Demandingness (D) and Responsiveness (R), and using median scores for higher and lower, the caregiver can be classified as exhibiting an authoritative (high D, high R), authoritarian (high D, low R), indulgent (low D, high R), or uninvolved (low D, low R) parental feeding style.

RESULTS

Table 1 provides descriptive statistics for the mothers and infants as obtained at the time of their recruitment. The average mother had less than a high school education. Their self-reported weight and derived Body Mass Index (BMI) indicates that over half were overweight prior to becoming pregnant. Approximately half of the mothers were of Mexican origin, with the remainder split between Black and Latina.

Table 2 displays the CAFS scores derived from the observations made at the 3-month home visit, as well as the weight measures collected at 3-months and 2-years.

Table 1: Baseline Measures for Mothers and Infants (n=65)

Maternal measures	Mean	Standard Deviation
Age in years	28.60	5.86
BMI before pregnancy	25.79	4.85
Weight gain during pregnancy (kg)	13.70	6.09
Highest school grade completed	9.55	3.26
Fed infant on demand	38%	
Fed infant on a schedule	58%	
Infant measures		
Age at recruitment (days)	29.69	19.30
Birthweight (kg)	3.24	.57
Race/ethnicity	24% Black	
	51% Mexican	
	25% other Latino	

Table 2 Infant Outcome Measures at 3-Months and 2-Years (n=65)

3-month measures	Mean	Standard Deviation
Age at first home visit (days)	93.00	11.32
Weight-for-length percentile	56.19	35.21
CAFS sensitivity to cues	12.12	2.24
CAFS response to distress	8.77	2.19
CAFS socio-emotional growth	9.02	2.72
CAFS cognitive growth	3.74	1.96
2-year measures		
Age at second home visit (days)	728.60	40.10
Age solid food introduced (months)	4.13	1.19
Weight at 2-years (kg)	13.26	2.08
BMI percentile for age and sex	70.62	27.29

As shown in Figure 1, the highest Caregiver Total at 3-months was associated with the authoritative feeding style at 3-years, with a score of 38.33. In contrast, the other three parental feeding styles hovered around a total score of 33, as the authoritarian, indulgent, and uninvolved styles were at 32.25, 34.25, and 33.00 respectively. As weight and height measures were obtained for the children at 2-years, BMI for age and sex were calculated for each child [22].

As shown in Figure 2, children whose mothers were categorized as authoritative with the CFSQ had the most optimal BMI for age and sex, with their average being closest to the 50th percentile.

DISCUSSION

In the present study, mothers were observed interacting with their 3-month-old infants during a feeding bout, and were scored with respect to their sensitivity and responsiveness. When their infants reached 3 years of age, the same mothers completed a questionnaire that allowed them to be classified as to their feeding style, along with the lines of how demanding and responsive they were while feeding their child.

While the literature on parenting styles has a relatively long history, with the authoritative style acknowledged as the most optimal, linkages to

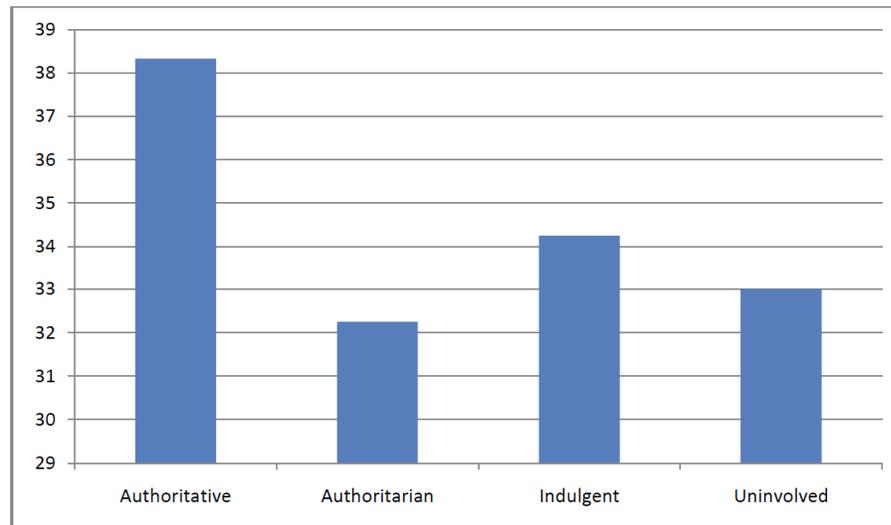


Figure 1: Caregiver total scores on Child Assessment Feeding Scale by parenting style. Scores can range from zero to 50.

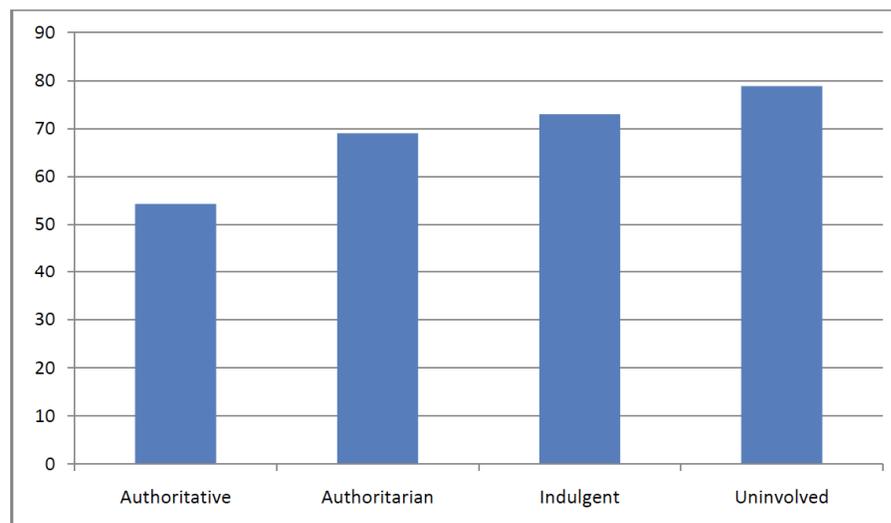


Figure 2: Children's BMI percentiles for age and sex by parenting styles.

outcomes such as child BMI have only recently been explored [11]. The present result, that an authoritative feeding style was associated with the healthier weight status, that is, child BMI at the 50th percentile, is in harmony with studies suggesting that authoritative parenting may lower the risk of children becoming overweight or obese [23-25]. Conversely, the finding that the uninvolved or neglectful style was associated with 2-year-olds who were at the 80th percentile for their BMI is supported by both longitudinal [26] and cross-sectional work [27].

Beyond the associations between parental feeding styles and child BMI, how infant feeding is approached by the caregiver before a feeding style per se emerges is also important. In the present study, responsive feeding at 3-months was the bellwether of an

authoritative feeding style at 3-years. As the authoritative style is largely defined by high responsiveness, these results suggest that responsive feeding in infancy may serve as a foundation for responsive feeding in childhood, and if coupled with reasonable demands of the child, may reflect optimal parenting in other contexts.

Despite these straightforward findings, limitations of the present investigation must be acknowledged. The sample was comprised of low-income, minority mothers, who chose to exclusively formula-feed their infants, rendering as only tentative their comparability to most studies on parenting and feeding style that have been largely conducted on white, middle-class samples. The WIC mothers in the current sample were also bereft of secondary education. However, available

research on low-income, minority families have shown feeding styles such as indulgent and uninvolved to predominate [8, 28], suggesting that the present results are valid.

Of greater concern might be that the maternal self-reports of parenting style were obtained a year after the anthropometric measures were made, raising the issue that the child's weight status may have influenced how she rated herself. However, evidence exists that parenting styles are relatively stable over the first 6 years of the child's life, suggesting that parental responsiveness, in particular, would not differ fundamentally from 24- to 36-months, and would likely have been similar if rated as early as 15-months [29].

In sum, the present study suggests that a sensitive and responsive maternal feeding style, evident in the first months of the infant's life, may be an indication of how responsive the mother will be as her child grows beyond toddlerhood. Although this investigation obtained data at different time points, longitudinal studies that observe feeding style repeatedly are certainly warranted. But given the associations were shown between feeding style and the child's weight parameters, interventions that seek to reduce the risk for childhood obesity should incorporate education for responsive feeding as a matter of course.

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REFERENCES

- [1] Skinner AC, Perrin EM, Skelton JA. Prevalence of obesity and severe obesity in US children, 1999-2014. *Obesity* 2016; 24: 1116-1123. <https://doi.org/10.1002/oby.21497>
- [2] Ebbeling CB, Pawlak DB, Ludwig DS. Childhood obesity: public-health crisis, common sense cure. *The Lancet* 2002; 360: 473-482. [https://doi.org/10.1016/S0140-6736\(02\)09678-2](https://doi.org/10.1016/S0140-6736(02)09678-2)
- [3] Worobey J. Risk factors for obesity in human infancy. In Davies D, Fitzgerald H, editors. *Obesity in America: Childhood to adolescence*. Westport, CT: Praeger Press 2018; in press.
- [4] Silventoinen K, Rokholm B, Kaprio J, Sorensen, TI. The genetic and environmental influences on childhood obesity. A systematic review of twin and adoption studies. *Intl J Obesity* 2010; 34: 29-40. <https://doi.org/10.1038/ijo.2009.177>

- [5] 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. *J Dev & Beh Peds* 2007; 22: 391-408. <https://doi.org/10.1097/00004703-200112000-00007>
- [6] 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: 201-210. <https://doi.org/10.1006/appe.2001.0398>
- [7] Faith MS, Storey M, Kral TVE, Pietrobelli A. The Feeding Demands Questionnaire: Assessment of parental demand cognitions concerning parent-child feeding relations. *J Am Diet Assoc* 2008; 108: 624-630. <https://doi.org/10.1016/j.jada.2008.01.007>
- [8] Hughes SO, Power TG, Fisher JO, Mueller S, Nicklas TA. Revisiting a neglected construct: parenting styles in a child-feeding context. *Appetite* 2005; 44: 83-92. <https://doi.org/10.1016/j.appet.2004.08.007>
- [9] Musher-Eizenman D, Holub S. Comprehensive Feeding Practices Questionnaire: Validation of a new measure of parental feeding practices. *J Ped Psychol* 2007; 32: 960-972. <https://doi.org/10.1093/jpepsy/jsm037>
- [10] Faith MS, Scanlon KS, Birch LL, Francis LA, Sherry, B. Parent-child feeding strategies and their relationships to child eating and weight status. *Obesity* 2004; 12: 1711-1722. <https://doi.org/10.1038/oby.2004.212>
- [11] Vollmer RL, Mobley AR. Parenting styles, feeding styles, and their influence on child obesogenic behaviors and body weight. A review. *Appetite* 2013; 71: 232-241. <https://doi.org/10.1016/j.appet.2013.08.015>
- [12] Hubbs-Tait L, Kennedy TS, Page MC, Topham GL, Harrist AW. Parental feeding practices predict authoritative, authoritarian, and permissive parenting styles. *J Am Diet Assoc* 2008; 108: 1154-1161. <https://doi.org/10.1016/j.jada.2008.04.008>
- [13] Darling N, Steinberg L. Parenting style as context: An integrative model. *Psych Bulletin* 1993; 113: 487-496. <https://doi.org/10.1037/0033-2909.113.3.487>
- [14] Maccoby EE, Martin JA. Socialization in the context of the family. In Mussen PH, series editor, Hetherington EM, volume editor. *Handbook of child psychology (vol. 4): Socialization, personality, and social development*. 4th ed. New York: Wiley 1983; pp. 1-101.
- [15] Baumrind D. Effects of authoritative parental control on child behavior. *Child Dev* 1966; 37: 887-907. <https://doi.org/10.2307/1126611>
- [16] Black MM, Aboud FE. Responsive feeding is embedded in a theoretical framework of responsive parenting. *J Nutr* 2011; 141: 490-494. <https://doi.org/10.3945/jn.110.129973>
- [17] Hurley KM, Cross MB, Hughes SO. A systematic review of responsive feeding and child obesity in high-income countries. *J Nutr* 2011; 141: 495-501. <https://doi.org/10.3945/jn.110.130047>
- [18] Thompson AL, Mendez MA, Borja JB, Adair LS, Zimmer CR, Bentley ME. Development and validation of the Infant Feeding Style Questionnaire. *Appetite* 2009; 53: 210-221. <https://doi.org/10.1016/j.appet.2009.06.010>
- [19] Worobey J. Observational scales of mother-infant feeding: A catalog and review. In Worobey J, editor. *Infant feeding: Parental perceptions, behaviors, and health effects*. New York: Nova Biomedical 2016; pp. 197-213.
- [20] Women, Infants, and Children. United States Department of Agriculture, Food and Nutrition Service 2018. [cited 2018 Aug 28] Available from: <https://www.fns.usda.gov/wic/women-infants-and-children-wic>

- [21] Sumner G, Spietz A. NCAST Caregiver/Parent Interaction Feeding Manual. Seattle: NCAST Publications 1995.
- [22] Centers for Disease Control and Prevention. BMI percentile calculator for child and teen 2018. [cited 2018 Aug 28] Available from: <https://www.cdc.gov/healthyweight/bmi/calculator.html>
- [23] Olvera N, Power TG. Parenting styles and obesity in Mexican American children: A longitudinal study. *J Ped Psych* 2010; 35: 243-249. <https://doi.org/10.1093/jpepsy/jsp071>
- [24] Rhee KE, Lumeng JC, Appugliese DP, Kaciroti N, Bradley RH. Parenting styles and overweight status in first grade. *Pediatrics* 2006; 117: 2047-2054. <https://doi.org/10.1542/peds.2005-2259>
- [25] Wake M, Nicholson JM, Hardy P, Smith K. Preschooler obesity and parenting styles of mothers and fathers. Australian national population study. *Pediatrics* 2007; 120: e1520-e1527. <https://doi.org/10.1542/peds.2006-3707>
- [26] Fuemmeler BF, Yang C, Costanzo P, Hoyle RH, Siegler IC, Williams RB, Ostbye T. Parenting styles and body mass index trajectories from adolescence to adulthood. *Health Psych* 2012; 31: 441-449. <https://doi.org/10.1037/a0027927>
- [27] Rodenburg G, Oenema A, Kremers SPJ, van de Mheen D. Parental and child fruit consumption in the context of general parenting, parental education and ethnic background. *Appetite* 2012; 58: 364-372. <https://doi.org/10.1016/j.appet.2011.11.001>
- [28] Hennessy E, Hughes SO, Goldberg JP, Hyatt RR, Economos CD. Permissive parental feeding behavior is associated with an increase in intake of low-nutrient-dense foods among American children living in rural communities. *J Academy Nutr Diet* 2012; 112: 142-148. <https://doi.org/10.1016/j.jada.2011.08.030>
- [29] Dallaire DH, Weinraub M. The stability of parenting behaviors over the first 6 years of life. *Early Childhood Res Quarterly* 2005; 20: 201-219. <https://doi.org/10.1016/j.ecresq.2005.04.008>

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