Correspondence between Maternal Determination of Child Fullness and Young Children's Self-Determined Fullness Level: Results from a Standardized Laboratory Protocol

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Abstract

Background: This study examined maternal understanding and acceptance of young children's ability to self-assess fullness using a mixed-methods approach.

Methods: Twenty low-income mothers of 5- to 7-year-olds participated in this semistructured laboratory study. After consumption of a buffet dinner meal, mothers were asked to indicate their perception of their child's fullness level, and children were also asked to self-assess their fullness level.

Results: Five of the 20 mothers in the study were initially correct in their assessment of their child's level of fullness. Half of the incorrect mothers were willing to change their rating when informed that the child's fullness rating was different than her own.

Conclusions: Semistructured interview results provide suggestive evidence that some mothers believe they understand their child's fullness level better than their children. Given that mothers have the potential to override children's ability to self-regulate eating behavior, teaching mothers to understand and appreciate young children's ability to self-regulate eating is an important area for intervention.

Introduction

Children need to regulate their caloric intake to meet their daily energy expenditures to maintain a healthy weight.¹ This ability has been demonstrated in infants and continues into early childhood.² However, by early childhood, some children show poor levels of self-regulation of energy intake, which increases their risk for childhood obesity.³ The factors that hinder children's self-regulation of energy intake are not well understood, but certain parenting behaviors have been conceptualized as a contributing factor.⁴ Previous researchers have argued that high levels of maternal restriction or pressure to eat interfere with development of optimal self-regulation of energy intake. These researchers contend that children whose

mothers exhibit high levels of control tend to focus less on their own internal feelings of hunger and fullness when determining how much to eat and, instead, focus on external cues from their mothers (e.g., encouragement to continue to eat beyond satiety).⁴⁻⁶ Over time, highly controlling maternal feeding practices may interfere with children's internal cues of hunger and satiety and impair the development of children's self-regulation of energy intake.⁷ This may, in turn, increase their risk for obesity. Because of this, mothers are an important social influence on young children's ability to self-regulate their own energy intake.

Possible mechanisms have been examined through exploratory research methods. For example, previous observational^{8,9} and focus group data¹⁰ support that some mothers

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do not trust their young children's ability to self-assess their own levels of fullness. This is a major reason these mothers do not pay attention to their children's feelings and comments regarding fullness. We were interested in investigating mothers' trust, mistrust, and understanding of their young children's ability to self-assess fullness after a meal. Given previously discussed links between maternal behavior and children's obesity risk,⁴⁻⁶ we believe this to be a possible mechanism through which parents influence children's obesity risk.

The aim of this study was to conduct exploratory research to systematically examine this issue by comparing mothers' and children's self-reports of children's fullness in a structured laboratory task, using both quantitative and qualitative methods. Given previous observational and focus group results, we hypothesized that mothers and children would not be consistent in their reports of child fullness, and that when given an opportunity to change their estimates once they heard their child's responses, most mothers would not be willing to modify their rating of child fullness. Including opportunities for feedback throughout semistructured, open-ended interviews, we hoped to gather information regarding why some mothers accurately assessed their child's level of fullness, why some mothers' assessment of their child's level of fullness was not the same as the child self-reported, and why mothers did or did not change their responses once they were told their child's self-assessment of fullness.

Methods

This study was approved by the institutional review board of Baylor College of Medicine (Houston, TX). Consent for study participation was obtained from the mothers; child assent was also obtained. Confidentiality was assured.

Parental Assessment of Children's Ability to Understand Fullness Task

Each mother-child pair ate a standardized buffet dinner meal together in a laboratory room with a couch, desk, dining table, and chairs. Mothers were notified about the meal before coming into the laboratory and instructed not to feed their child before the meal. Mothers and their children were given 40 minutes to eat the dinner meal. Study staff did not explicitly tell mothers whether they should serve their child, whether their child should serve themselves, or whether they could or could not go back for seconds. After 40 minutes, a staff member came into the room and informed the mother and child that they had 5 minutes to finish eating. After the buffet meal, the mother and child participated in another task that took 12 minutes. While the child was facing away from the mother and engaged in the other task, the experimenter showed the mother a clipboard containing a sheet of paper with a series of fullness figures and asked the mother to indicate her perception of her child's level of fullness after having eaten the buffet meal.

Perceptions of child fullness were assessed with figures adapted from Fisher and Birch.¹¹ To increase variability in child and maternal responses, the number of figures was increased from three to five. The figures were labeled "hungry," "a little bit hungry," "halfway full," "almost full," and "full" (Fig. 1). After the experimenter administered the measure to the mother, she completed self-report questionnaires, and the experimenter administered the same procedure to the child to address his or her level of fullness. Having the mothers complete self-report questionnaires was intended to distract the mothers from paying attention to their child's answers. The experimenter explained the fullness figures to the child, and said:

"So, I want to know how full your stomach feels right now. And, I have these figures here to help us out. This figure over here (point to figure) is the empty stomach. There is no food in this stomach; it is hungry. This figure over here is the full stomach (point to it). This stomach is full because of the amount of food in it. These other figures here have different amounts of food in it (point to each one). Each one has a little more food in it than the other. So we have the empty or hungry stomach, and then there's some food in these stomachs, until we reach the full stomach (point to each picture in order). Do you see that? Good! OK, now let's think about our own stomachs (put your hand over your stomach). I'd like you to point to the figure that shows how full your stomach feels right now. You pick this one? OK!"

Last, the experimenter showed the mother her response as well as her child's response. If the mother and child both selected the child's fullness level as the same, the experimenter asked the mother how she knew the child's level of fullness. If the mother's answer differed from the child's answer by one or more fullness levels, the experimenter told the mother her child's self-assessed level of fullness and asked her whether she would like to change her answer. If she did decide to change her assessment, the experimenter asked about her reasons for modifying her answer; if she did not change her assessment, the experimenter probed to identify the reasons the mother was not willing to change her response. All interviews were conducted by trained research assistants.

Interviews were conducted in English or Spanish at the mother's request. All interviews were audio-/videotaped and transcribed verbatim. Spanish transcriptions ($n=3$) were translated into English by bilingual research staff and back-translated into Spanish to ensure linguistic integrity. Upon transcribing, all ($n=20$) audio-/videotapes were played back and compared directly to the transcriptions to assure data validity.¹² Analyses of transcriptions were conducted using thematic analysis techniques.¹³

Results

Mothers recruited to participate in this pilot study were part of the pilot group for a larger study ($n=198$) of maternal feeding practices focusing specifically on African American and Hispanic populations. Twenty low-income mothers and their 5- to 7-year-old children (half African

Fullness Task

Date: _____ ID: _____

Staff: _____ Caregiver / Child

Parents and children are asked to circle how full they feel on the corresponding figure. The experimenter then shows parents their answer and their child's answer. If the parent's answer differs from their child's, parents are given a chance to change their assessment of their child's fullness level.

Figure 1. Frankel and Hughes five-level fullness sheet given to both child and parent. Adapted from Fisher and Birch.¹¹

American and half Hispanic) were recruited from Head Start centers. Thirteen children were girls (65%). Children ranged in age from 5.4 to 7.2 years (mean age, 6.5).

All 20 children participating in the protocol were able to locate their stomach when asked to do so by the experimenter. They were also able to point to which of the five fullness figures best represented how full their stomach was.

Examination of the interview responses suggested themes regarding maternal perceptions of child fullness. These themes were (1) observing the child's consumption during the meal, (2) listening to the child, and (3) doubting the child.

Mothers who estimated their child's fullness at the same level that their child self-assessed it ($n=5$ of 20) reported observing their child during meals. For example, one mother reported paying attention to "the amount he eats" whereas another reported that her child "starts slowin' down" when asked how she knew her child was full. They also engaged the child for feedback during the course of the meal. As one of these mothers said: "So, when she was eating, I asked her if she wanted some more and that's when she said that she was full."

Although the remaining 15 mothers were not initially correct in assessing their child's level of fullness, ap-

proximately half ($n=8$) were willing to change their opinion when they were told their child's assessment (Table 1). A theme of listening to the child emerged among these mothers. Upon being probed to explain why she changed her rating after hearing that the child had rated herself as full, one mother said, "Because she's sayin' that she feels full and apparently she's full (laughs)." These mothers tended to trust their child's self-reported fullness level. As one mother explained, "If she feels like she [is] more full, she may be."

Seven mothers were not willing to change their opinions of their child's level of fullness (Table 1). There were concurrent themes of parents reporting that they observed their child's eating often coupled with doubt that their child could be at the fullness level that they self-assessed in the protocol. For example, a mother explained why she did not want to change her rating given that her child had rated himself as "half-way full" and she had rated him as "full" with the following reasoning: "Uh, because he didn't finish his dessert. Otherwise, he would..." Other mothers reported repeated experiences of their child expressing fullness and then being hungry shortly thereafter. For example, one mother said her child would say "I am full"

Table 1. Concordance Between Mother's and Child's Rating of Child's Fullness

Parent ethnicity	Child	Mother	Mother: postinterview change?	Mother: postinterview number
African American	5	3	Yes	5
African American	5	2	No	2
African American	5	5	N/A	5
African American	4	4	N/A	4
African American	5	5	N/A	5
African American	5	4	No	4
African American	5	5	N/A	5
African American	5	4	Yes	5
African American	4	3	Yes	4
African American	4	5	No	5
Hispanic	4	5	No	4
Hispanic	4	5	No	5
Hispanic	5	4	No	4
Hispanic	2	5	Yes	4
Hispanic	5	5	N/a	5
Hispanic	5	4	Yes	5
Hispanic	4	3	Yes	5
Hispanic	3	5	No	5
Hispanic	2	4	Yes	3
Hispanic	4	3	Yes	4

and like 2 minutes later, she's like 'mom, I am hungry again.'" As another mother explained, "When we get home, she's going to say that she want some food [giggles]."

Discussion

The aim of this study was to create a mechanism for researchers to explore whether parents understand and respect young children's ability to self-assess fullness by comparing mothers' and children's reports of children's fullness in a structured laboratory setting. Additionally, this protocol examined the reasons why mothers would or would not change their own assessments when there was a mismatch between their own assessment of their child's fullness level and their child's self-assessment of fullness. When the mother was informed that the child's self-reported fullness rating was different than hers, only half of the mothers were willing to change their rating. These results are consistent with previous observational studies of maternal feeding practices.^{8,9}

In addition to providing preliminary data regarding mothers' understanding of preschool children's ability to determine their levels of fullness, the protocol used here could provide further insights into parent influences on

children's ability to regulate their own energy intake. Although researchers have hypothesized that certain parenting behaviors⁴ are not conducive to children learning to pay attention to their own internal cues of hunger and fullness,^{14,15} there is little evidence in previous studies as to *how* this may occur. This protocol could be used in future studies to better understand how parents influence their children's ability to self-regulate energy intake.

All 20 children participating in the protocol were able to locate their own stomach as the experimenter asked them to do so and point to which of the five fullness figures best represented how full their stomach. This provides suggestive evidence that future researchers might be able to use five fullness figures instead of three in studies that involve self-assessments of fullness between the ages of 5 and 7. Others have reached similar conclusions; for example, the children in this age group were able to use five figures to self-assess pain.^{16,17}

Results from the current study suggest that mothers who estimate their child's level of fullness in concordance with their child's perceived level of fullness pay attention to their child's fullness cue throughout the dinner meal. Mothers whose assessments of their child's level of fullness differed from their child tended to be willing to (1)

shift their perceptions of their child's fullness level when given their child's self-report or (2) not shift their perceptions because of past experiences.

Ten differences between mother's report of her child's fullness and child's self-report were only one scale point away from each other; only five differed by more than one fullness rating point, but these 5 mothers represented 25% of the sample. The high levels of maternal accuracy might have been owing to the fact that the child had just finished eating, so, in most cases, the mother and child chose a 4 (almost full) or a 5 (full) on the 5-point scale. If these fullness perceptions were collected between meals or after a small snack, lower levels of agreement might have been found. However, almost half of incorrect mothers (Table 1) in this study decided not to change their ratings after learning their child's rating, which suggests that some mothers felt that they were better at assessing their children's feelings of fullness than their preschool children. This could partially account for the high levels of eating prompts found in the observational studies reviewed in the *Introduction*.⁹

Mothers who did not correctly guess their child's level of fullness provided potentially important information that should be investigated with a larger sample by replicating this protocol. Some mothers who were unwilling to change their answer to how full their child was were unwavering because of their overall sense that their young child was not yet able to respond to his or her own level of hunger and fullness. This elucidates a potentially important area for interventions. In order for this to happen, though, mothers need to first understand and appreciate the fact that children are able to self-regulate their energy intake.¹⁵

This study was not without limitations. The sample was small ($n=20$), but acceptable for exploratory research. In the future, investigators should aim to replicate this study with a larger group of parent-child dyads stratified by key characteristics. This will allow future researchers to examine differences in assessments of child fullness based on parent feeding styles, parent and child weight status, racial/ethnic differences, and child gender. The possibility that mothers are pressuring children to eat less or more because of perceptions of their child's weight, rather than direct feedback from their child on their own fullness, suggests directions for future research. For example, researchers interested in using this protocol should observe parent-child interactions around food to assess whether parents who are incorrect in their perceptions of their child's fullness after a meal use pressuring or restrictive feeding practices during that meal and whether this is more common when children are under- or overweight.

Nine of the 10 African American children in the current sample were girls. This made it difficult to assess whether differences in mothers' understanding of fullness were owing to racial/ethnic differences or child gender. Further, no information was gathered regarding child preferences for the foods served at the buffet and child consumption. Additionally, although children typically had their back to the mother and were engaged in

another task while mothers were assessing their child's levels of fullness, mothers might have been able to see or hear their child self-assess their own fullness level and vice versa. We know that one child overheard the experimenter explaining that the mother rated her child as "almost full" while the child rated herself as full. Upon hearing this, the child exclaimed, "I am full!" This mother responded by laughing and stating to the experimenter, "I would like to stick with what I said." Future researchers interested in using this protocol should consider the benefits of separating mothers from their children when gathering fullness assessments on the child; though this could ensure more consistency across experimental dyads, it could also stress children at this age and influence their responses.

Conclusions

Researchers interested in the mechanisms by which mothers influence children's self-regulation of energy intake would benefit from using this protocol. This protocol has the potential to increase our understanding of how mothers influence the development of child self-regulation around eating. Additionally, once these data are replicated in larger samples, information gathered from the protocol can be used to inform future interventions.

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Author Disclosure Statement

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References

1. Woods SC, Seeley RJ, Porte D, Jr., et al. Signals that regulate food intake and energy homeostasis. *Science* 1998;280:1378–1383.
2. Schwartz C, Scholtens PA, Lalanne A, et al. Development of healthy eating habits early in life. Review of recent evidence and selected guidelines. *Appetite* 2011;57:796–807.

3. Carnell S, Wardle J. Appetite and adiposity in children: Evidence for a behavioral susceptibility theory of obesity. *Am J Clin Nutr* 2008;88:22–29.
4. Johnson SL, Birch LL. Parents' and children's adiposity and eating style. *Pediatrics* 1994;94:653–661.
5. Birch LL, McPhee L, Shoba BC, et al. "Clean up your plate": Effects of child feeding practices on the conditioning of meal size. *Learn Motiv* 1987;18:301–317.
6. Birch LL, Ventura AK. Preventing childhood obesity: What works? *Int J Obes (Lond)* 2009;33(Suppl 1):S74–S81.
7. Birch LL, Davison KK. Family environmental factors influencing the developing behavioral controls of food intake and childhood overweight. *Pediatr Clin North Am* 2001;48:893–907.
8. Agras WS, Hammer LD, McNicholas F, et al. Risk factors for childhood overweight: A prospective study from birth to 9.5 years. *J Pediatr* 2004;145:20–25.
9. Orrell-Valente JK, Hill LG, Brechwald WA, et al. "Just three more bites": An observational analysis of parents' socialization of children's eating at mealtime. *Appetite* 2007;48:37–45.
10. Goodell LS, Antono AC, Daniel JC, et al. A qualitative investigation of how parents determine fullness in their preschool children. *FASEB J* 2013;27:37.6.
11. Fisher JO, Birch LL. Eating in the absence of hunger and overweight in girls from 5 to 7 y of age. *Am J Clin Nutr* 2002;76:226–231.
12. Ashmore M, Reed A. Innocence and nostalgia in conversation analysis: The dynamic relations of tape and transcript. Paper presented at Forum: Qualitative Social Research. 2000;1: Article 3.
13. Braun V, Clarke V. Using thematic analysis in psychology. *Qual Res Psychol* 2006;3:77–101.
14. Birch LL. Psychological influences on the childhood diet. *J Nutr* 1998;128:407S–410S.
15. Ramsay SA, Branen LJ, Fletcher JM, et al. "Are you done?" Child care providers verbal communication at mealtimes that reinforce or hinder children's internal cues of hunger and satiation. *J Nutr Educ Behav* 2010;42:265–270.
16. Fanciullo GJ, Cravero JP, Mudge BO, et al. Development of a new computer method to assess children's pain. *Pain Med* 2007;8: S121–S128.
17. Hunter M, McDowell L, Hennessy R, et al. An evaluation of the Faces Pain Scale with young children. *J Pain Symptom Manage* 2000;20:122–129.

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