



## Maternal concerns about children overeating among low-income children



Megan H. Pesch<sup>a,\*</sup>, Monika Rizk<sup>b</sup>, Danielle P. Appugliese<sup>c</sup>, Katherine L. Rosenblum<sup>b,d</sup>,  
Alison Miller<sup>b,e,f</sup>, Julie C. Lumeng<sup>a,b,g</sup>

<sup>a</sup> Division of Developmental and Behavioral Pediatrics, Department of Pediatrics and Communicable Diseases, University of Michigan, Ann Arbor, MI, USA

<sup>b</sup> Center for Human Growth and Development, University of Michigan, Ann Arbor, MI, USA

<sup>c</sup> Appugliese Professional Advisors, North Easton, MA, USA

<sup>d</sup> Department of Psychiatry, Medical School, University of Michigan, Ann Arbor, MI, USA

<sup>e</sup> Department of Psychology, University of Michigan, Ann Arbor, MI, USA

<sup>f</sup> Department of Health Behavior and Health Education, School of Public Health, University of Michigan, Ann Arbor, MI, USA

<sup>g</sup> Department of Nutritional Sciences, School of Public Health, University of Michigan, Ann Arbor, MI, USA

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### ABSTRACT

Addressing overeating is essential to obesity treatment and prevention. The objectives of this study were to investigate maternal concern for child overeating, to identify associated participant characteristics and to determine if concern for child overeating is associated with maternal feeding practices. Low-income mothers ( $N = 289$ ) of children (mean age 70.8 months) participated in a semi-structured interview. Themes of maternal concern for child overeating were identified and a coding scheme was reliably applied. Maternal feeding practices were measured by questionnaire and videotaped eating interactions. Logistic regressions were used to test the associations of participant characteristics with the presence of each theme, and bivariate analyses were used to test the associations of the presence of each theme with feeding practices. Three themes were identified: 1) mothers worry that their child does overeat, 2) mothers acknowledge that their child may overeat but indicate that it is not problematic because they manage their child's eating behavior, and 3) mothers acknowledge that their child may overeat but indicate that it is not problematic because of characteristics inherent to the child. Child obesity predicted the themes; mothers of obese and overweight children are more likely to be concerned about overeating. Themes were associated with lower levels of observed pressure to eat. Only Theme 2 was associated with greater restrictive feeding practices. Interventions that provide parents' practical, healthy ways to prevent child overeating may be helpful.

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### 1. Introduction

Overtaking is an overarching construct that could be conceptualized as encompassing several types of obesogenic behaviors such as eating in the absence of hunger (Birch, Fisher, & Davison, 2003), enjoyment of food (Wardle, Guthrie, Sanderson, & Rapoport, 2001), food responsiveness (Wardle et al., 2001), low satiety responsiveness (Wardle et al., 2001), and loss of control eating (Tanofsky-Kraff et al., 2007). All of these behaviors, which could be considered forms of overeating perceived by parents, have been associated with greater risk of child obesity and overweight or higher body mass index (BMI) z-scores

(Birch et al., 2003; Domoff, Miller, Kaciroti, & Lumeng, 2015; Vannucci et al., 2012).

Maternal beliefs surrounding child obesity have received attention as potential intervention targets. Specifically, researchers have extensively described the difficulties mothers have in accurately recognizing that their child is overweight (Baughcum et al., 2001; Campbell, Crawford, & Ball, 2006; Carnell, Edwards, Croker, Boniface, & Wardle, 2005; Jansen & Brug, 2006; Jeffery et al., 2015; May et al., 2007; Spargo & Mellis, 2014; Warschburger & Kröller, 2012), leading to public health efforts to ensure that parents are aware of their child's overweight status (Chomitz, Collins, Kim, Kramer, & McGowan, 2003; Nihiser et al., 2007). Additionally, researchers have examined whether or not mothers are concerned about their child's weight status when they are aware their child is overweight (Campbell et al., 2006; Carnell et al., 2005; Moore, Harris, & Bradlyn, 2012), on the premise that greater concern for the health effects of overweight is associated with greater parental readiness to help their child lose weight (Rhee, De Lago, Arscott-Mills, & Mehta, 2005). Despite these relatively large

Abbreviations: SEP, standardized eating protocol; BMI, body mass index; CFQ, Child Feeding Questionnaire.

\* Corresponding author at: University of Michigan, 300 N. Ingalls Street, 1109 SE, Ann Arbor, MI 48109-5464, USA.

E-mail address: [pesch@umich.edu](mailto:pesch@umich.edu) (M.H. Pesch).

literatures, only two studies (Baughcum et al., 2001; Johannsen, Johannsen, & Specker, 2006) have focused specifically on whether mothers are concerned about their children overeating. Furthermore, we have been unable to identify any studies that have examined whether maternal concern for overeating is associated with differences in parenting and feeding practices.

Understanding maternal concern for overeating is important for childhood obesity intervention as it is a step in the path toward motivating behavior change around child feeding. Recognizing that one's child is overweight is necessary, but likely not sufficient, to change maternal feeding behaviors. The next step, being concerned about the child being overweight, is likewise necessary, but also not sufficient, to change maternal behavior. Specifically, many mothers recognize their child is overweight and are concerned about it, but perceive the overweight as being due to inadequate physical activity, genetics, or metabolism (Jain et al., 2001). In order to motivate change in maternal feeding behaviors, mothers must be concerned that the child is overeating. However, no work to date has examined this question without combining the construct of overeating with others concerns such as concern for fussy eating (Johannsen et al., 2006) or concern for overweight (Baughcum et al., 2001). Examining maternal concern for overeating as an independent construct, as well as associated feeding behaviors, may provide insights that could lead to novel targets for childhood obesity interventions involving mothers.

A number of studies have examined characteristics of the child and mother that predict maternal concern for overweight as well as the accuracy of perception of child weight (Rietmeijer-Mentink, Paulis, Middelkoop, Bindels, & Wouden, 2013). Accurate perception of child weight status has been predicted by older child age (Jeffery et al., 2015; Rietmeijer-Mentink et al., 2013), female child sex (Jeffery et al., 2015), and lower child and maternal weight status (Carnell et al., 2005; Rietmeijer-Mentink et al., 2013; Warschburger & Kröller, 2009). However, we could not identify any studies that have examined associated characteristics with maternal concern for overeating. Understanding if concern for overeating is associated with specific characteristics of the child, the mother or household could be important for identification of key participants for intervention programs.

Some prior work has examined the associations between the related constructs of concern about the child becoming overweight and controlling feeding practices (Birch & Fisher, 2000; Cachelin & Thompson, 2013; May et al., 2007), finding an association between concern for overweight with higher levels of restriction and lower levels of pressuring (May et al., 2007). No prior studies have examined the relationship between maternal concern for child overeating and feeding practices.

Therefore the objectives of this study were three-fold: 1) to explore maternal concern for overeating, 2) to examine whether child, mother and household characteristics predict maternal concern for child overeating, and 3) to evaluate if maternal concern for child overeating predicts maternal feeding practices. We hypothesized that having an obese child would predict maternal concern for child overeating and that maternal concern for child overeating would predict maternal feeding practices.

## 2. Methods and materials

### 2.1. Participants

Participants were a convenience sample of 289 low-income female primary caregiver–child dyads from South-central Michigan, who enrolled in a longitudinal study examining psychosocial and behavioral contributors to children's obesity risk in 2009–2011. Participant characteristics are provided in Table 1. Participants in the original longitudinal study were invited through their child's Head Start program (free, federally subsidized preschool programs for low-income children) to participate in a study about children's eating behaviors. Participants were

**Table 1**  
Participant characteristics, (n = 289).

	Mean (SD) or n (%)
<b>Child characteristics</b>	
Sex (male); n (%)	149 (51.6)
Age (months); mean (SD)	70.8 (8.4)
Child weight status; n (%)	
Obese (BMI ≥ 95th %)	61 (21.1)
Overweight (BMI 85th– < 95th %)	60 (20.8)
Normal weight (BMI 5th– < 85th %)	164 (56.7)
Underweight (BMI < 5th %)	4 (1.4)
<b>Maternal characteristics</b>	
Age (years); mean (SD)	31.1 (7.1)
BMI; mean (SD)	33.1 (9.4)
Race/ethnicity; n (%)	
White non-Hispanic	198 (68.5)
Black non-Hispanic	46 (15.9)
Hispanic	23 (8.0)
Other (Native American, Asian, Pacific Islander or Biracial)	22 (7.6)
<b>Household characteristics</b>	
Food security; n (%)	
Secure	199 (68.9)
Insecure	90 (31.1)
<b>Maternal self-reported feeding behavior</b>	
CFQ Monitoring; mean (SD)	4.0 (1.0)
CFQ Restriction; mean (SD)	3.3 (0.9)
CFQ Pressure; mean (SD)	2.7 (1.1)
<b>Observed maternal feeding behavior</b>	
Home mealtime restriction <sup>a</sup> ; n (%)	
Non-askers	56 (21.1)
Infrequent restriction	71 (26.7)
Varied restriction	59 (22.2)
Frequent restriction	80 (30.1)
Home Mealtime Pressure <sup>a</sup> ; n (%)	
Low Total Pressure	36 (13.6)
Medium Total Pressure	145 (54.9)
High Total Pressure	83 (31.4)
SEP Total Discouragements for Chocolate Cupcakes <sup>b</sup> ; mean (SD)	1.66 (2.58)
SEP Total Discouragements for Green Beans and Artichokes <sup>b</sup> ; mean (SD)	1.00 (2.22)
SEP Total Encouragements for Green Beans and Artichokes <sup>b</sup> ; mean (SD)	6.79 (6.78)

<sup>a</sup> n = 266.

<sup>b</sup> n = 225.

followed longitudinally, and about 2 years after the original study ended in 2011, they were invited to participate in this follow-up study, which was explained as seeking to “understand how mothers and caregivers feed their children.” Of the parent sample, 95% were biological mothers. The remaining 5% were adoptive mothers, step-mothers and grandmothers; henceforth we refer to the entire group as “mothers”.

Eligible mothers were fluent in English, had less than a four-year college degree, and prepared and ate dinner with their children at least 3 days a week. Exclusion criteria for the parent study included the child having a gestational age less than 35 weeks, significant perinatal or neonatal complications, serious medical problems or food allergies, any form of disordered eating or foster care.

### 2.2. Study design

This was an observational cross-sectional study. The mothers participated in a semi-structured interview and completed questionnaires, all without the child present. Anthropometrics were measured at a second visit. Dyads participated in up to three video-recorded home dinner mealtimes, and a laboratory feeding session using a standardized eating protocol (SEP). The Institutional Review Board approved the study protocol. The mothers provided written informed consent and were each compensated \$150.

## 2.3. Measurements

### 2.3.1. Maternal concerns about child overeating

Maternal beliefs about child overeating were elicited through an audio-recorded semi-structured interview that focused on mothers' beliefs about feeding their children. Interviews were administered by trained full-time research staff and conducted in the mother's home or at a local community center. Interviewers were trained to avoid giving positive, negative or leading reactions to a mother's answers. This study describes responses to a single open-ended question which occurred near the middle of the interview, following a series of questions about mealtimes at home, child eating behaviors, and child feeding practices: "Do you ever worry that your child does or might eat too much?" If mothers answered affirmatively, interviewers were trained to ask additional questions, specifically: "Tell me more about what you worry about?". Sample questions from the interview are shown in Table 2.

The methods of developing, administering, and analyzing this interview have been previously described in detail (Goulding et al., 2014; Kalinowski et al., 2012; Pesch, Harrell, Kaciroti, Rosenblum, & Lumeng, 2011). The constant comparative method (Glaser & Strauss, 2009) was used by two team members to independently identify themes in the mothers' responses. The themes were then reviewed in a group by the research team (one developmental psychologist, one clinical psychologist, and a pediatrician) and highly concordant themes were identified. Once the themes were finalized a coding scheme was developed so that each mothers' response could be coded for the presence or absence of each individual theme. The two study team members independently coded 30 interviews to establish reliability (Cohen's kappa > 0.70), after which the remaining interviews were coded.

### 2.3.2. Anthropometrics

Heights and weights of all the children and mothers were measured according to standardized procedures (Shorr, 1986). The children were categorized as being obese (defined as BMI  $\geq$  95th percentile for age and sex), overweight (defined as a BMI  $\geq$  85th to <95th percentile for age and sex), or not overweight (defined as a BMI < 85th percentile for age and sex) based on the United States Center for Disease Control and Prevention growth charts.

**Table 2**

Sample questions from the semi-structured interview.

- 
- (1) How do people in your house usually eat their meals on a typical day?
    - 1A. About mealtime– what works well and what does not?
  - (2) Can you describe yesterday's dinner?
 

[probe: Help me just imagine what it looked like, how it was, how did it happen?]

[probe: You know, where it was, who was there, what you ate?]

    - 2A. And thinking about the dinner that you just described, how did you feel about it?
    - 2B. Is there anything that you would change that would make it a better experience from your perspective?
    - 2C. Was that a typical dinner?
  - (3) What are special foods for you and [your child], and why are these special?
  - (4) How do you know if [your child] is growing appropriately?
    - 4A. When do you seek advice on how to feed [your child]?
    - 4B. Thinking about advice on how your child in growing, has anyone been especially helpful or unhelpful?
  - (5) "How much" questions:
    - 5A. Do you ever worry that [your child] doesn't or might not eat enough?
 

[If yes: Tell me more about that, what do you worry about?]
    - 5B. Do you ever worry that [your child] does or might eat too much?
 

[If yes: Tell me more about that, what do you worry about?]
  - (6) "Kinds of food" questions:
    - 6A. Do you ever worry about the kinds of foods [your child] eats?
    - 6B. [ASK ONLY IF PARENT HAS SAID "NO" OR IS UNSURE REGARDING 6A]: Does anything about the kinds of foods [your child] eats bother or concern you at all?
 

[if yes: Tell me about that.]
- 

### 2.3.3. Demographics

Child sex and age were collected via questionnaire completed by the mother. The mother also reported her own age and race/ethnicity. Household food security was categorized as food secure versus food insecure as reported by the mother via the USDA Household Food Security Scale (Bickel, Nord, Price, Hamilton, & Cook, 2000).

### 2.3.4. Maternal feeding practices

Maternal feeding practices were measured by self-report and observational methodology (as described in detail below). We focused on five maternal feeding practices: 1) monitoring, defined as tracking what and how much a child eats to ensure the child eats enough healthy foods and does not overeat (Vaughn et al., 2015), 2) pressuring, defined as pushing children to eat more food or increase their intake of healthy foods (Gregory, Paxton, & Brozovic, 2010), 3) restriction, defined as restricting a child's access to junk food and restricting the total amount of food consumed (Birch et al., 2001), 4) encouragement, defined as suggesting specific foods to the child as a prompt to eat (Vaughn et al., 2015), and 5) discouragement, defined as forbidding or commanding a child not to eat certain foods or more food (Klesges et al., 1983). The constructs of pressure and encouragement overlap, in that the goal of both behaviors is to get the child to eat more food, however pressure often implies an overly controlling, coercive or demanding type of behavior (Vaughn et al., 2015), whereas encouragement describes the non-coercive, gentle and sensitive ways a parent may try to guide their child's intake of more healthy foods (Vaughn et al., 2015). The construct of discouragement is subsumed under the construct of restriction, with discouragement being characterized as mother's overt statements and actions to limit their child's intake, whereas restriction also includes a mother's covert actions such as strictly limiting access to food or opportunities to consume those foods (Vaughn et al., 2015).

**2.3.4.1. Maternal self-reported feeding practices.** Maternal self-reported feeding practices were measured by the Child Feeding Questionnaire (CFQ) (Birch et al., 2001), a reliable and valid (Birch et al., 2001; Kaur et al., 2006) 31-item measure of child feeding practices. We examined three CFQ subscales and one additional question: CFQ Monitoring, CFQ Restriction, CFQ Pressure and CFQ Perceived Child Weight. Restrictive feeding behaviors were measured by CFQ Monitoring which assesses mothers' perceived tracking of her child's intake of palatable and high fat foods (3 items, Cronbach's  $\alpha$  = 0.86), and CFQ Restriction, which assesses mothers' perceptions of limiting her child's intake of palatable and high fat foods (8 items, Cronbach's  $\alpha$  = 0.75). Mother's self-reported pressure to eat was measured by CFQ Pressure, which assesses mothers' perception of pressuring her child to eat more food (4 items, Cronbach's  $\alpha$  = 0.62). We hypothesized that maternal perception of child weight status may be associated with her concern for overeating, therefore we included CFQ Perceived Child Weight which assesses mothers' perception of her child's weight current weight status (1 item). (Birch & Fisher, 2000; Gregory et al., 2010; May et al., 2007) Mothers responded on a 1–5 Likert scale, and contributing items were averaged to generate a mean score, with higher scores for each subscale reflecting more of the behavior or perception.

**2.3.4.2. Maternal observed feeding practices.** Observed maternal feeding practices were measured through video-recorded home mealtime observations and in a laboratory setting.

For the home mealtime observations, each mother was loaned a video camera and asked to record three of the child's typical dinner mealtimes over a one-week period. Mothers were instructed to set up the camera with the child's upper torso, food and drink in view and to record the entire meal. Of the 289 dyads, 222 (83.5%) submitted three codeable videos, 260 (90.0%) submitted two or more and 266 (92.0%) submitted at least one.

In order to quantify an individual mother's restrictive feeding practices during the home mealtime observations, each videotape was

coded for whether children were ever observed to request more food or non-water beverage (yes vs. no) and the mother's response (denial vs. approval of the request). Coders were trained to reliability; 12% of videos were coded by two raters and reliability exceeded a Cohen's kappa of .70.

To measure restrictive feeding practices, a Home Mealtime Restriction variable was then created with four mutually exclusive categories to classify the child's food-requesting behavior and the mother's denial or approval of the food request. Because not all participants had all 3 videotapes, participants were categorized based on behaviors observed in the available videotapes. Categories were: 1) Frequent restriction, which consisted of children who requested more food/beverage in  $\geq 50\%$  of recorded meals and had a request was denied  $\geq 50\%$  of the recorded meals, 2) Varied restriction, which consisted of children who requested more food/beverage in  $< 50\%$  of recorded meals and had a request denied in  $\geq 50\%$  of the meals, 3) Infrequent restriction, which consisted of those children who requested more food/beverage in  $< 50\%$  of recorded meals with the request denied in  $< 50\%$  of the videos, and those children who requested more food/beverage in  $\geq 50\%$  of recorded meals with a request denied in  $< 50\%$  of videos and 4) Non-askers, those children who never asked for more food/beverage across any recorded home mealtime. Each dyad was classified into one of these four Home Mealtime Restriction categories.

In order to quantify an individual mother's pressuring practices during the home mealtime observations, each videotape was coded in 5 min intervals for whether the mother encouraged or pressured the child to eat more food (yes vs. no). Coders were trained to reliability; 12% of videos were coded by two raters and reliability exceeded a Cohen's kappa of .70.

The number of intervals in which pressuring practices were observed was summed across each individual video, and a variable representing the percentage of intervals in which pressuring behavior was observed was created. Low percentage pressure was defined as the mother pressuring in  $0\% - < 50\%$  of video intervals. Medium percentage pressure was defined as the mother pressuring in  $50\% - < 75\%$  of intervals. High percentage pressure was defined as the mother pressuring in  $\geq 75\%$  of intervals. To measure maternal pressuring behaviors across the multiple videos each dyad submitted, a Home Mealtime Pressure variable was created with three mutually exclusive categories to classify the mother's pressuring behavior across mealtimes. The categories: 1) Low Total Pressure which consisted of mothers whose mealtime videos were all categorized as low percentage pressure, or a combination of low and medium percentage pressure, 2) Medium Total Pressure which consisted of mothers whose mealtime videos were all categorized as medium percentage pressure, and 3) High Total Pressure, which consisted of mothers whose videos all consisted of high percentage pressure.

Maternal feeding practices were also measured in a laboratory setting, during which mother-child dyads participated in a videotaped SEP. This standardized protocol, which has been described elsewhere (Goulding et al., 2014; Lumeng & Burke, 2006), serves to reduce the broad variability that occurs during home mealtimes (e.g., distractions of other family members or television, or mother attending to food preparation, other children etc.) and provides a behavioral "press" by presenting the dyad with foods that may be unlikely to be served during a typical family mealtime. The child and mother were presented with individual portions of four different types of foods in randomized order. They were invited to try each food, and left alone for 4 min. The four foods included green beans (familiar vegetable), artichoke hearts (unfamiliar vegetable), chocolate cupcakes (familiar dessert) and halva (unfamiliar dessert). Each participant was served one cup of green beans (Del Monte, Cut Green Beans, No Salt Added,  $123.7 \pm 0.5$  g), one cup of artichoke hearts (Reese Quartered, Artichoke Hearts,  $123.7 \pm 0.5$  g), two cupcakes (Hostess Chocolate Cupcakes,  $104.96 \pm 0.5$  g), and one-quarter container of halva (Ziyad, Halva with Vanilla,  $76 \pm 0.5$  g). The child and mother were served identical portion sizes. For this study, we focused only on behavior occurring during the

presentation of the green beans, artichokes and chocolate cupcakes. We chose to examine the mothers' encouraging and discouraging behaviors during the presentation of the vegetables (green beans and artichokes) based on two competing hypotheses. First, we hypothesized that mothers who were concerned about overeating in their children may pressure them to eat healthy foods. However, we also hypothesized that mothers who were concerned about overeating may discourage their children's intake of vegetables with the goal of limiting overall caloric intake. We also examined mothers' discouragement of child food intake during the presentation of the chocolate cupcakes since it was hypothesized that this food would be most likely to elicit overeating in the child and discouragement from the mother.

Observed maternal feeding practices were quantified in the SEP by counting maternal verbal and physical encouragements and discouragements using the Bob and Tom's Method of Assessing Nutrition (BATMAN) (Klesges et al., 1983) coding scheme. Two raters coded 20% of the videos, with intra-class correlation coefficients exceeding 0.78. To capture the mothers' behaviors in relation to the vegetables, we created two variables summing mothers' physical and verbal encouragements as well as her physical and verbal discouragements for the presentation of both green beans and artichokes which we called SEP Total Encouragements for Green Beans and Artichokes and SEP Total Discouragements for Green Beans and Artichokes, reflecting the total counts of maternal physical and verbal discouragements for the presentation of the vegetables. To capture the mothers' behavior around the chocolate cupcake, we created a summary variable that we termed SEP Discouragements of Chocolate Cupcake reflecting the total counts of maternal physical and verbal discouragements for the presentation of the cupcake.

Of the 289 dyads, 225 completed the SEP; the majority of the dyads who did not complete the SEP were excluded due to food allergies in the mother (which was not an exclusion for enrollment in the parent study) or the development of food allergies in the child since initial enrollment in the parent study 2 years prior. Food allergies were an exclusion criteria for participation in the SEP due to safety considerations.

#### 2.4. Statistical analysis

To analyze associations of characteristics of the child, mother and household with the presence of each theme, we performed three separate logistic regression models including child factors (child sex, child age in months and child obesity (vs. not overweight), child overweight (vs. not overweight), three maternal factors (maternal age, maternal BMI and CFQ Perceived Child Weight) and one household factor (food insecure vs. not)

To test whether the presence of each theme was associated with maternal self-reported or observed feeding practices, we conducted t-tests, Analysis of Variance (ANOVA) or chi-square tests for each of the three themes with each measure of feeding practices (CFQ Monitoring, CFQ Restriction, CFQ Pressure, Home Mealtime Restriction, Home Mealtime Pressure, SEP Total Discouragements of Chocolate Cupcakes, SEP Total Discouragements of Green Beans and Artichokes, and SEP Total Encouragements of Green Beans and Artichokes). A significance level of  $p \leq 0.05$  was set for all models.

### 3. Results

#### 3.1. Themes in maternal responses

Three themes in maternal responses were identified (see Table 3 for illustrative quotes from each theme):

##### 3.1.1. Theme 1: mothers worry that their child does or may overeat

Approximately a third ( $n = 92, 31.88\%$ ) of mothers in this sample expressed concern that their child could overeat. The mothers often expressed that their children had voracious appetites, sometimes eating more than their mothers did, often to the point of experiencing physical



**Table 3**  
Themes and illustrative quotes.

Theme 1: The mother worries that her child does or may overeat
"Yes she's starving all the time, and if she's offered food, she will eat it. So she doesn't ever say 'I'm not hungry'... and she's a little thing, she's not big, but she eats a lot. I mean sometimes at dinner she will eat more than I do, so, now I'm just eh [sighs] concerned that it—as she grows older if she continues on that path that she will become overweight or develop unhealthy eating habits. But right now, I also don't wanna to tell her 'no you can't have something because you've already ate so much'."
"Sometimes, yeah, he can [overeat]... he can put away some food. Um, say we're havin' hot dogs for dinner, his little brothers will eat maybe two. He'd like to try [to eat] like four or five and I think that's just way too many. I don't want him to get sick from eatin' too much so we stop him. We'll be like 'you know, three is enough'."
Theme 2: The mother acknowledges that her child does or may overeat, but indicates that it is not a problem because the mother actively manages the child's eating behavior
"Um, sometimes she can get carried away on her treats. Like, she'll want them more and that bothers me. Like, I want her to know that those are treats and that's for like a special occasion or if she eats all of her meal or all of her vegetables or something like that then she can get a dessert... [but] I'm not worried about it because, overall I'm the mom and I'm in control of what she eats. But I do wish she didn't ask me for treats so much."
"There were a few times at school that he ate so much that he got sick just because he liked it and wanted to eat it, and he got sick. So I mean, just it varies. But um, when I'm at home I kinda regulate, and 'no you don't get that snack now' or 'no you can't have that right now... you just ate. You need to wait a few hours'."
Theme 3: The mother acknowledges that the child does or may overeat, but indicates that it is not a problem because of characteristics inherent to the child.
"No. She doesn't eat too much... if she says she's not hungry, usually by the time it's time for bed she doesn't ask for another snack and that's how I know like she had enough. 'Cause sometimes I'll be like 'you, you, eat eat eat.' She'll be like 'no, no' or, then she'll eat a couple more and then she'll be like 'Oh mom, I'm full I had too much'."
"Like he'll sit and smash a whole box of popsicles if you can't keep your eye on him... Um, but like I said, I mean normally he'll pick the healthy foods. He'll want fruits and vegetables before he does anything else so I don't really worry about him eatin' too much at all."

discomfort or vomiting. Some mothers described their children having the tendency to eat when they were bored, or when mothers doubted that their child was actually hungry. Some mothers expressed that due to concerns for their child overeating, they had to monitor or restrict their child's intake. They would do so by limiting portion size, access to junk food or giving the child additional helpings of fruits and vegetables to get full. Other mothers expressed concerns that although their child may overeat, they were hesitant to restrict their child's eating in case the child was in fact still hungry or was experiencing a growth spurt. Many mothers expressed concerns that habits of overeating could lead to obesity, as well as concerns about the negative emotional and social consequences their children could face due to being overweight (e.g. being teased at school or having low self-esteem). The mothers also discussed concerns for negative health consequences of obesity as an adult, often mentioning a family history of obesity.

### 3.1.2. Theme 2: mothers acknowledge that their child does or may overeat, but indicate that it is not a problem because the mother actively manages the child's eating behavior

Just under a third ( $n = 79$ , 27.3%) of mothers expressed that while they believed their child was at risk for overeating, it was not problematic because of actions the mother took to shape her child's eating habits. The mothers described behaviors such as limiting their children's access to palatable foods, limiting additional helpings and providing portion control. The mothers also described being in control of the types of food the child ate, ensuring the child had healthy options. Some mothers expressed concerns that as their child grew older and gained more independence the mothers had less control over their child's eating, which was a potential area for concern.

### 3.1.3. Theme 3: mothers acknowledge that their child does or may overeat, but indicate that it is not a problem because of characteristics inherent to the child

Many mothers ( $n = 109$ , 37.7%) expressed that although they felt that their child was at risk for overeating, they were not concerned because of specific qualities or behaviors of the child that attenuated this risk. For example, the mothers described that their children often made healthy food choices and stopped eating when they were full. They described their children limiting their portion size, and being able to self-regulate how much food was "enough" for them. Mothers described that their children had "good metabolism", or had healthy weights because of the children's inherent good eating habits.

### 3.2. Characteristics of child, mother and household associated with each theme

The results of logistic regression analyses are shown in Table 4. Child obesity (versus not overweight) (OR 5.39, 95% CI 2.54–11.43), child overweight (versus not overweight) (OR 2.20, 95% CI 1.11–4.33), and household food insecurity (OR 1.83, 95% CI 1.02–3.27) were associated with endorsement of Theme 1. Child obesity (versus not overweight) (OR 2.32, 95% CI 1.07–5.01), child overweight (versus not overweight) (OR 2.04, 95% CI 1.03–4.03), and older child age (OR 1.01, 95% CI 0.98–1.05) were associated with endorsement of Theme 2. Only child obesity (versus not overweight) (OR 2.22, 95% CI 1.10–4.51) was associated with Theme 3.

### 3.3. Associations of themes with maternal feeding practices

Results of bivariate analyses of themes with maternal restrictive feeding practices are shown in Table 5. Endorsement of Theme 1 was associated with lower levels of Home Mealtime Pressure ( $p = 0.03$ ), but not with any other feeding practices. Endorsement of Theme 2 was associated with lower levels of CFQ Pressure ( $p = 0.02$ ), Home Mealtime Pressure ( $p = 0.03$ ), and higher levels of restriction as measured by SEP Total Discouragements of Chocolate Cupcakes ( $p = 0.04$ ). Theme 3 was associated with lower levels of Home Mealtime Pressure ( $p = 0.03$ ), but not with any restrictive feeding practices.

## 4. Discussion

This study, examining maternal concern for child overeating, makes several new contributions to the literature. First, like others (Baughcum et al., 2001), we found that mothers are concerned about their children overeating. Second, we found that mothers often felt that their children were at risk for overeating, but felt that it was not problematic because they managed their children's eating habits (e.g., through monitoring and restriction). Third, we found that mothers felt that their children were at risk of overeating, but felt it was not problematic because of protective characteristics inherent to the child (e.g., stopping eating when full, being a picky eater). To our knowledge, these latter two findings have not been previously described in the literature. The fourth major finding of this study is that the observed themes regarding how mothers think about overeating in their children were predicted by child obesity and overweight. Finally, we found mothers who endorsed the themes of maternal concern about child overeating generally had lower levels of observed, but not self-reported, pressuring behaviors. In addition, only one of the themes (Theme 2) was associated with a maternal restrictive feeding practice, specifically higher levels of SEP Total Discouragements of Chocolate Cupcakes.

The finding that nearly a third of the mothers in this study expressed concern about their child overeating may signal an important first step toward behavior change, especially in mothers of obese and overweight children. Specifically, a parent must recognize that a behavior is problematic before he or she will be motivated to change parenting to address it. Therefore, these mothers may be ready to receive guidance

**Table 4**

Logistic regression analyses of participant characteristics and themes of maternal concern for child overeating.

Participant characteristics	Theme		
	1	2	3
	Mothers worry their child does or may overeat	Child is at risk for overeating but it is not problematic because mother manages it	Child is at risk for overeating but it is not problematic because of characteristics inherent to the child
	OR (95% CI)	OR (95% CI)	OR (95% CI)
<i>Child characteristics</i>			
Child obese (vs. not overweight)	5.39 (2.54–11.43)**	2.32 (1.07–5.01)*	2.22 (1.10–4.51)*
Child overweight (vs. not overweight)	2.20 (1.11–4.33)*	2.04 (1.03–4.03)*	1.78 (0.93–3.26)
Child age (months)	1.62 (0.94–2.78)	2.04 (1.18–3.53)*	1.00 (0.61–1.63)
Child sex (male)	1.00 (0.97–1.03)	1.01 (0.98–1.05)	1.01 (0.98–1.04)
<i>Maternal characteristics</i>			
Maternal age (years)	0.99 (0.95–1.03)	0.99 (0.96–1.04)	1.01 (0.97–1.04)
Maternal BMI	0.99 (0.96–1.02)	0.99 (0.96–1.02)	0.99 (0.96–1.01)
CFQ perceived child weight	2.31 (0.76–6.98)	1.95 (0.69–5.54)	0.40 (0.13–1.19)
<i>Household characteristics</i>			
Food security (insecure vs. secure)	1.83 (1.02–3.27)*	1.40 (0.78–2.50)	1.45 (0.86–1.19)

\*  $p \leq 0.05$ .\*\*  $p \leq 0.01$ .

about how to address overeating in their child. Two-thirds of the mothers in this study did not express concern about their child overeating. There are several possible explanations. First, mothers may be accurately perceiving that their child is not overeating, even in obese and overweight children, since maintenance of obesity does not require consuming a substantially greater number of calories (Troiano, Briefel, Carroll, & Bialostosky, 2000). In addition, some of the children may appropriately eat to satiety and not beyond it. Thus, their caloric intake may accurately match their hunger and satiety, but still result in overweight or obesity. Much remains to be learned about the regulators of hunger and satiety and their contribution to children's weight status.

Maternal concern for overeating was also predicted by household food insecurity. It is possible that if food is a scarce resource in a

household, a mother may worry that her child is consuming more than their share of the household's food. It is also possible that these mothers are concerned that they may not be able to supply enough food for their child's voracious appetite (Olson, Bove, & Miller, 2007). Mothers in food insecure households may also be observing their children overeat when food becomes available after a period of deprivation (Olson et al., 2007). Much additional work needs to be done to unravel the relationships between maternal concern for overeating, child eating behaviors, maternal feeding practices and food insecurity.

Theme 2, reflecting lack of concern due to maternal management was predicted by having an obese or overweight child, in addition to older child age. Mothers of obese and overweight children may feel blamed (Schwartz & Puhl, 2003) for their children's weight struggles

**Table 5**

Bivariate analyses of themes of maternal concern for child overeating with maternal restrictive feeding behaviors.

	Themes								
	1			2			3		
	Mothers worry their child does or may overeat			Child is at risk for overeating but it is not problematic because mother manages it			Child is at risk for overeating but it is not problematic because of characteristics inherent to the child		
	Yes	No	p-Value	Yes	No	p-Value	Yes	No	p-Value
	n = 92	n = 197		n = 79	n = 210		n = 109	n = 180	
	N (%) or mean (SD)			N (%) or mean (SD)			N (%) or mean (SD)		
<i>Self-reported measures</i>									
CFQ monitoring	4.08 (1.04)	3.98 (1.03)	0.47	4.12 (1.04)	3.95 (1.04)	0.22	4.03 (1.05)	3.99 (1.04)	0.54
CFQ restriction	3.44 (0.86)	3.25 (0.94)	0.11	3.31 (0.87)	3.31 (0.95)	0.99	3.26 (0.82)	3.34 (0.98)	0.13
CFQ pressure	2.62 (1.17)	2.77 (1.03)	0.29	2.49 (1.09)	2.82 (1.05)	0.02	2.42 (1.08)	2.92 (1.02)	0.19
<i>Observed measures</i>									
Home mealtime restriction									
Non-askers	20 (24.1)	36 (19.7)	0.34	13 (18.8)	43 (21.8)	0.90	22 (22.2)	34 (20.4)	0.34
Infrequent restriction	26 (46.5)	49 (26.8)	0.03	18 (26.1)	53 (26.9)	0.03	29 (29.3)	42 (25.2)	0.03
Varied restriction	13 (15.7)	46 (25.1)	0.32	15 (21.7)	44 (22.3)	0.04	20 (20.2)	39 (23.4)	0.30
Frequent restriction	28 (33.7)	52 (28.4)	0.58	23 (33.3)	57 (28.9)	0.28	28 (28.3)	52 (31.1)	0.69
Home mealtime pressure									
Low total pressure	18 (21.7)	102 (9.9)	0.89	39 (21.7)	21 (10.8)	0.96	15 (15.3)	21 (12.7)	0.77
Medium total pressure	43 (51.8)	102 (56.4)		39 (56.5)	106 (54.4)		58 (59.2)	87 (52.4)	
High total pressure	22 (26.5)	61 (33.7)		15 (21.7)	68 (34.9)		25 (25.5)	58 (34.9)	
SEP Total Discouragements of Chocolate Cupcakes	1.54 (2.56)	1.70 (2.57)		2.23 (2.96)	1.48 (2.43)		1.57 (2.37)	1.71 (2.70)	
SEP Total Discouragements of Green Beans and Artichokes	1.23 (3.25)	0.90 (1.55)		1.04 (2.61)	0.99 (2.09)		1.05 (2.51)	0.98 (2.03)	
SEP total Encouragements of Green Beans and Artichokes	6.72 (6.23)	6.80 (7.05)		6.13 (4.830)	6.99 (7.28)		6.85 (7.63)	6.76 (6.24)	

and that there is a societal expectation that mothers effectively manage overeating in their children (Puhl & Heuer, 2010; Schwartz & Puhl, 2003). The mothers who confidently explained that they managed their child's eating behavior may have been attempting to meet that societal demand for what defines "good parenting" (Kalinowski et al., 2012). The fact that this theme is associated with older child age, may reflect that parents of older children may be more actively involved in managing their child's eating and weight issues. Prior work (Jeffery et al., 2015), has shown that parents are more concerned about weight problems in their children as they get older. It is possible that this concern is manifesting in the mother's action to make changes for her child to curb their risk overeating. Clinicians may build upon mother's desires to manage their children's overeating, partnering with them to explore other methods and interventions focused on overeating.

Theme 3, mothers are not concerned about overeating because of characteristics inherent to the child, was also predicted by child obese weight status. It is possible that mothers are allying with their child around the issue of overeating. Mothers of obese and overweight children have two difficult roles to balance, as they must protect their child from societal stigmatization, while also helping them make healthy food choices in a non-punitive manner (Schwartz & Puhl, 2003). Thus, the themes that reflected a lack of concern for child overeating (either because mother reported that she was managing it, or because of protective qualities inherent to the child), may have reflected a healthy self-confidence around parenting and positive alliance with their child. These are important strengths to be built upon in any intervention, but may represent barriers to addressing obesity and overweight if they prevent parental acknowledgement that overeating may be a problem that needs to be addressed.

Lastly, this study found that maternal concerns for overeating were associated with some maternal feeding practices. Across themes, mothers who described concern for overeating were observed to pressure their child to eat less. Mothers who said that their children were at risk for overeating, felt that it was not problematic because of the mother's management, also had lower self-reported measures of pressure. To our knowledge these findings have not been described in the literature to date. With regard to maternal restrictive feeding practices, counter to our hypotheses, we found that maternal concern for overeating was not, in general, associated with either self-reported or observed maternal restrictive feeding practices. Mothers in our study also expressed that they are hesitant to restrict their child's intake, even when they are worried about the child eating too much, because of concerns about doing so in psychologically damaging way. Clinicians and nutrition professionals may be able to bridge this gap by praising parents for not pressuring their children, but also advising them on when and how to restrict food intake of their obese and overweight children in a manner that is supportive of the child and not punitive.

Limitations of this study include the relatively small sample size of low-income predominantly English-speaking mothers of 4–8 year old children recruited from a single geographical area in the US; therefore findings may not be generalizable non-English speakers, fathers or other family members who play a role in child feeding, as well as populations outside of South Central Michigan. The participants' responses in this study may have also been influenced by social desirability bias. Furthermore, 24% of study participants were missing videotaped observational data, which may have contributed to some bias in the results and limits generalizability. Coding of maternal feeding practices done on the large number of observational video recordings may not have been detailed enough to capture subtle differences. It must also be considered that although four distinct measures of maternal restrictive feeding practices were used in this study, it is possible that we did not fully capture mothers' behaviors to decrease their child's food intake, as prior work (Farrow, Blissett, & Haycraft, 2011) has found poor correspondence between mothers observed and reported feeding practices. Interpretation of the results of our bivariate regression analyses should be done with caution due to multiple comparisons.

## 5. Conclusions

Many mothers are concerned about their children overeating, especially those with obese and overweight children. Mothers with concerns about child overeating had lower levels of observed pressuring behaviors, but minimal differences in restrictive feeding behaviors. Mothers may be recognizing the problem of overeating in their obese and overweight children, but may be hesitant to restrict their children's intake. Future research should further investigate mothers' conceptualizations of child overeating, as well as self-perceived roles in managing it. Future interventions may focus on supporting mothers in recognizing the problem of overeating, as well as helping mothers implement parenting strategies for curbing their child's intake.

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### Contributors

JL, MP, KR, and AM designed the overall study. KR and JL developed the semi-structured interview. MR, JL and KR identified the themes from the semi-structured interview and designed the coding scheme. DA conducted the data analysis and contributed to drafting of the manuscript. MP conducted literature searches, interpreted the data with JL and drafted the manuscript. All authors contributed to and approved the final manuscript.

### Conflict of interest

All authors declare that they have no conflicts of interest to disclose.

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