



Affective tone of mothers' statements to restrict their children's eating



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ABSTRACT

Maternal restrictive feeding behaviors have been associated with child weight status. The affective tone of mothers' statements intended to restrict their children's eating has not been examined. The objectives of this study were to describe the affective tone of mothers' restrictive feeding behaviors (positive or negative), and to test the association of child and mother characteristics with rates of Restriction with Positive Affect, Restriction with Negative Affect and Total Restriction. A total of 237 low-income child-mother dyads (mean child age 5.9 years) participated in a videotaped standardized laboratory eating protocol, during which mothers and children were both presented with large servings of cupcakes. A coding scheme was developed to count each restrictive statement with a positive affective tone and each restrictive statement with a negative affective tone. To establish reliability, 20% of videos were double-coded. Demographics and anthropometrics were obtained. Poisson regression models were used to test the association between characteristics of the child and mother with counts of Restriction with Positive Affect, Restriction with Negative Affect, and Total Restriction. Higher rates of Restriction with Positive Affect and Total Restriction were predicted by child obese weight status, and mother non-Hispanic white race/ethnicity. Higher rates of Restriction with Negative Affect were predicted by older child age, child obese weight status, mother non-Hispanic white race/ethnicity, and lower mother education level. In conclusion, in this study mothers of obese (vs. non-obese) children had higher rates of restriction in general, but particularly higher rates of Restriction with Negative Affect. Rather than being told not to restrict, mothers may need guidance on how to sensitively restrict their child's intake. Future studies should consider the contributions of maternal affect to children's responses to maternal restriction.

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1. Introduction

Maternal restriction, defined as a mother's efforts to limit the total amount of food consumed by her child (Birch et al., 2001), has been linked with childhood obesity (Faith, Scanlon, Birch, Francis, & Sherry, 2004; Rollins, Savage, Fisher, & Birch, 2015) and may be an important target for intervention. It is theorized that excessive or

inappropriate parental control over children's diet and eating may lead to poorer child self-regulation of consumption (Birch & Fisher, 1998) by focusing the child's attention on external cues to eat, rather than internal cues of satiety. Alternatively, it has also been proposed that parents' restriction of child intake may be a response to a child's weight gain, rather than causal (Rhee et al., 2009). Much remains to be understood, however, about maternal restrictive feeding practices. Work to date examining restrictive feeding practices has primarily relied on maternal self-report (Faith et al., 2004; Rollins et al., 2015), and has conceptualized restrictive feeding as limiting the child's intake of unhealthy foods or limiting

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portion size. The manner in which parents communicate restriction to their children, however, has received little attention.

The affective tone, defined as the content, warmth and tone of voice with which a mother communicates restriction to her child, may be important not only with regard to the effectiveness of the mother's efforts to limit the child's intake, but also for the child's self-esteem and the parent-child relationship. A mother may gently tell her child that he or she may not have a second serving of an unhealthy food, or may harshly command her child to stop eating. Restricting children's intake with a harsh and shaming tone is clearly not desirable. However, restricting children's intake with a kind and supportive affective tone may be a valuable way to teach children self-regulation and manage children's eating behavior in an obesogenic environment.

To our knowledge, the affective tone of mothers' restrictive statements has not been previously examined. However, a related literature has described less optimal maternal affect and family emotional climate in association with less optimal child feeding (Frankel et al., 2015), problematic eating behaviors in children (Birch & Fisher, 1998; Hafstad, Abebe, Torgersen, & von Soest, 2013; Hughes et al., 2011), concern about child feeding (Hughes et al., 2011), and overweight in children and has highlighted the importance of examining affect as a contributor to the feeding interaction (Frankel et al., 2015). A better understanding of mothers' affective tone while restricting children's intake and predictors of this tone could inform child obesity interventions (Frankel et al., 2015; Hughes et al., 2011). In addition, identifying characteristics of the mother and child that predict mothers' affective tone while restricting intake could help to target potential participants in interventions.

Therefore, the first objective of the study was to describe the affective tone of mothers' statements intended to restrict their children's food intake in an observational feeding interaction with a snack food. The second objective was to examine the association of child and mother characteristics with the affective tone of the mother's restriction.

2. Methods

2.1. Participants

Participants were a convenience sample of 237 low-income child-female primary caregiver dyads (mean child age 5.9 years) from Michigan who participated in an original longitudinal study examining contributors to children's risk of obesity from 2009 to 2011. Participants in the original study ($n = 380$) were invited through their child's Head Start program (a free, federally subsidized preschool program for low-income children) to participate in a study about children's eating behaviors. Participants were then followed longitudinally, and about two years later invited to participate in this follow-up study, which was explained as seeking to "understand how mothers and caregivers feed their children." Of the 296 female primary caregiver-child dyads participating in this study, 95% were biological mothers. The remaining 5% were adoptive mothers, stepmothers and grandmothers; henceforth we refer to the entire group as "mothers".

For the original study, exclusion criteria included the child having a gestational age less than 35 weeks, significant perinatal or neonatal complications, serious medical problems or food allergies, disordered eating or foster care or the mother not speaking English fluently and/or having more than a four-year college. As all child participants were originally recruited from Head Start, they were aged three to four-years and living in low-income families at the time of recruitment into the original study. The University of Michigan Institutional Review Board approved the study, and

mothers provided written informed consent and were compensated \$60 for their participation.

A total of 296 dyads participated. The Structured Eating Protocol (SEP) (Goulding et al., 2014; Pesch et al., 2016; Radesky et al., 2015) is a laboratory based eating interaction designed to capture children's and mothers' responses to different foods. Dyads were excluded ($n = 49$) from participating in this protocol if the mother had a food allergy or the child had a food allergy (which had developed since inclusion in the original study). An additional 3 dyads were not able to complete the SEP due to scheduling. Of the 244 who completed SEPs, 7 were excluded from this analysis for the following reasons: 2 for missing maternal body mass index (BMI), 1 for the child becoming ill during the protocol, 2 for the mother speaking a language other than English during the SEP, and 2 for the video being uncodable (due to noise or video recording malfunction). This resulted in a sample of 237 dyads.

2.2. Measures

2.2.1. Maternal restriction

Maternal restriction of child food intake was measured in the SEP, which is a standardized, structured eating protocol which has been described in detail elsewhere (Goulding et al., 2014; Pesch et al., 2016; Radesky et al., 2015). This protocol examines the mother's and child's responses to different types of foods in a laboratory setting, thereby reducing the broad variability that may occur during observations of home mealtimes (e.g., sibling interference, mother attending to other family members or food preparation, etc.).

The SEP has strong test-retest reliability across approximately two years, with correlations for the amount consumed by children for desserts ($r = 0.45$), vegetables ($r = 0.31$) and total amount of food consumed ($r = 0.43$; p -values for all statistics reported <0.05). Validity of the SEP is supported by correlations between mothers' encouragements or discouragements of their child's intake during the SEP, as measured by the Bob and Tom's Method of Assessing Nutrition (Klesges et al., 1983), and mother's feeding practices and beliefs as measured by the Caregiver Feeding Style Questionnaire (CFSQ) (Hughes, Power, Orlet Fisher, Mueller, & Nicklas, 2005) and the Preschooler Feeding Questionnaire (PFQ) (Baughcum et al., 2001). Higher rates of maternal total encouragements during the SEP correlated with more maternal demandingness ($r = 0.26$) as measured on the CFSQ. Higher rates of maternal total discouragements during the SEP correlated with higher maternal concern about her child overeating or becoming overweight ($r = 0.32$), as measured by the PFQ.

During the protocol, the mother and child were presented with individualized portions of four different foods by a research assistant. The four foods were presented one food at a time, sequentially and in randomized order, to the mother and child concurrently. These foods, which differed based on familiarity and sweetness (dessert vs vegetable) were: chocolate cupcakes (familiar dessert), green beans (familiar vegetable), halva (unfamiliar dessert) and artichoke (unfamiliar vegetable). The mother and child were seated at a table alone in a quiet room, and were videotaped throughout the entire procedure. After presentation of each food type, the mother and child were invited to try the food if they wanted, and left alone for 4 min. This study focused only on the videotaped segment of the protocol during which the mother and child were presented with chocolate cupcakes, as it was hypothesized that this palatable and familiar dessert, served in large portion size, would elicit restrictive feeding behaviors from the mothers. The mother and child were each served two cupcakes (Hostess Chocolate Cupcakes, 104.96 ± 0.5 g) and portion sizes for both were identical.

A coding scheme was developed to capture mothers' restrictive feeding behaviors. The coding scheme was created using an iterative

process over the course of several meetings by three authors, and was informed by note-taking while watching 50 video segments from the SEP, and review of the separate literatures around maternal restriction (Birch et al., 2001; Klesges et al., 1983; Ogden, Reynolds, & Smith, 2006) and affective tone (Miller, McDonough, Rosenblum, & Sameroff, 2002; Rubin, Cheah, & Fox, 2001).

Restriction was defined as statements, utterances, questions or phrases said by the mother directed to her child specifically about limiting food intake. Physical restriction (e.g., the mother taking food out of the child's hand) was exceedingly infrequent and not included in this analysis. Each restriction statement was categorized as having either a neutral-to-positive affective content and tone of voice or a negative affective content and tone of voice. Neutral-to-positive restriction statements (henceforth referred to as positive restriction statements) were sensitive, caring, affectionate, warm, gentle or benevolent in their content and tone of voice. Statements could range from matter of fact and straightforward (neutral) to more actively positive or affectionate (positive). Statements could also include mild kind humor. Statements were not shaming and often constructively guided the child's eating. Negative restriction statements, in contrast, were critical, barbed, unkind or harsh in content and tone of voice. These statements often conveyed the sense that the mother was disgusted, embarrassed, disappointed or uncomfortable with the child's eating. There was at times hostility, shaming, unkind humor or harsh sarcasm in the content of her statement and tone. Two raters independently coded 20% of the video segments. Coders first identified a restriction statement and then categorized it as positive or negative in tone. Coders also transcribed the restriction statement verbatim. Reliability was calculated based on the counts of each code (restriction with positive affect and restriction with negative affect) across each video segment. Cohen's kappa exceeded 0.70 for both codes (restriction with positive affect and restriction with negative affect). Once reliability was established, the remainder of the videos were coded.

Counts of positive and negative restriction statements were summed for each dyad, creating two variables which we call Restriction with Positive Affect and Restriction with Negative Affect. The sum of Restriction with Positive Affect and Restriction with Negative generated the variable Total Restriction.

2.2.2. Child and mother characteristics

Mothers reported child age and sex and their own race/ethnicity and education level. Mothers completed the Center for Epidemiologic Studies-Depression scale (20 items, Cronbach's $\alpha = 0.91$), a valid and reliable (Radloff, 1977) measure which assesses mothers' symptoms of depression. Clinically significant maternal depressive symptomatology was defined as a score greater than or equal to 16.

Heights and weights of mothers and children were measured according to standardized procedures (Shorr, 1986). Body mass index (BMI) was calculated as weight in kilograms divided by height in meters squared. For 13 (5.5%) mothers who were pregnant or had recently given birth, self-reported pre-pregnancy weight was used instead of measured weight. Children were categorized as being obese (BMI \geq 95th percentile for age and sex) or not obese (BMI < 95th percentile for age and sex) based on the United States Center for Disease Control and Prevention growth charts.

2.2.3. Statistical analysis

We constructed three separate Poisson regression models with the predictors being characteristics of the child and mother, and the outcomes being Restriction with Positive Affect, Restriction with Negative Affect and Total Restriction, respectively. The characteristics of the child and mother included in the model were: child age, child sex and child obese weight status (obese vs. not); and

maternal race/ethnicity (white non-Hispanic vs. other), highest level of maternal education achieved (high school diploma or less vs. greater than a high school diploma), maternal BMI, and maternal depressive symptoms (clinically significant depressive symptoms vs. not) as the predictors. A p -value of < 0.05 was considered statistically significant.

3. Results

Characteristics of the sample are provided in Table 1. Just over half (50.2%) of the children were male, and 20.3% were obese. Of the mothers, 73.4% were non-Hispanic white, just under half (48.1%) had a high school education or less. The average maternal BMI was 33.0, which is in the obese weight status range. There were, on average for each dyad during the 4 min segment with the cupcakes, 1.05 (standard deviation 1.38, range 0–7) statements that were Restriction with Positive Affect, 0.32 (standard deviation 0.95, range 0–7) that were Restriction with Negative Affect, and 1.37 (standard deviation 1.83, range 0–11) Total Restriction.

Examples of Restriction with Positive Affect and Restriction with Negative Affect are shown in Table 2.

Results of the analyses evaluating child and maternal predictors of restriction are presented in Table 3. Predictors of Restriction with Positive Affect included child obesity (RR = 1.62, 95% CI 1.22–2.15, $p < 0.001$) and maternal non-Hispanic white race/ethnicity (RR = 1.37, 95% CI 1.01–1.87, $p = 0.04$). Predictors of Restriction with Negative Affect included child obesity (RR = 3.76, 95% CI 2.31–6.13, $p < 0.001$), child age in months (RR = 1.05, 95% CI 1.02–1.05, $p = 0.002$), maternal non-Hispanic white race/ethnicity (RR = 3.45, 95% CI 1.70–7.01, $p = 0.001$) and lower maternal education (RR = 1.89, 95% CI 1.18–3.01, $p = 0.01$). Predictors of Total Restriction included child obesity (RR = 1.97, 95% CI 1.54–2.51, $p < 0.001$) and maternal non-Hispanic white race/ethnicity (RR = 1.65, 95% CI 1.24–2.18, $p < 0.001$). Comparison of the adjusted means of Restriction with Positive Affect, Restriction with Negative Affect and Total Restriction for mothers of obese and not obese children are presented in Fig. 1.

4. Discussion

To our knowledge, this is the first report describing the affective

Table 1
Participant characteristics (N = 237).

	N (%) or mean (SD)
Child age (months)	70.88 (8.54)
Child sex (male)	119 (50.21)
Child weight status	
Obese	48 (20.25)
Overweight	49 (20.68)
Normal weight	137 (57.81)
Underweight	3 (1.27)
Mother race/ethnicity	
White non-Hispanic	174 (73.42)
Black non-Hispanic	30 (12.66)
Hispanic, any race	17 (7.17)
Other	16 (6.75)
Mother's highest level of education achieved	
\leq high school diploma	114 (48.10)
> high school diploma	123 (51.90)
Mother's BMI	33.03 (9.39)
Mother's depressive symptoms	
Clinically significant symptoms (≥ 16)	79 (33.33)
Not clinically significant (<16)	158 (66.67)
Restriction with Positive Affect	1.05 (1.38)
Restriction with Negative Affect	0.32 (0.95)
Total Restriction	1.37 (1.83)

Table 2
Examples of maternal Restriction with Positive Affect and Restriction with Negative Affect.

Restriction with positive affect
"Come on, you are going to be done because this is too much." (said in a neutral guiding manner) – Mother of normal weight boy
"Your tummy is going to hurt because you are going to eat these, and then you're going to have cake tonight for your birthday. Your tummy might hurt if you eat a lot of chocolate." – Mother of overweight boy
"Maybe ... can we save that until after you've tried the other things? No, you want to eat it all right now?" (said in a neutral tone, after child begins to eat the second cupcake). – Mother of normal weight boy
"Uh uh, do not do that." (said with neutral to positive affect after child puts more cupcake in mouth) – Mother of normal weight boy
"Whoa honey, don't over-do it okay? You can choke by shoving it in there too much. I know you're excited about the cupcakes, but you don't want to choke on them. Don't eat it yet." (said with a slight smile with positive affect) – Mother of overweight boy
"Honey you don't have to clean that up, ok? Can you just eat one of them? Cause it's not good to eat both of them." – Mother of normal weight girl
"One's enough." (said in a matter-of-fact tone with neutral affect) – Mother of obese boy
"You have one. Mmm, you've got enough there." (said with slight sweet joking tone, after child asks if he can have more cupcakes) – Mother of obese boy
Restriction with Negative Affect
"Eat over your plate and relax. Nobody's taking it from you!" (said in a harsh critical manner) – Mother of obese girl
"Do whatever you want. Embarrass yourself. I don't care!" (said harshly and divisively after child takes a big bite of cupcake) – Mother of obese girl
"[Child]! Stop eating like that!" (said as child takes a big bite) – Mother of obese boy
"Don't you dare think about eating both of those either! Because it's too much junk food!" (said with negative and slightly aggressive tone) – Mother of normal weight boy
"You're going to eat dinner, just to let you know. And I don't want to hear that your stomach is upset either. [Child], calm down! [Child], why are you eating like that?..." Stop eating like a pig!" – Mother of obese boy
"No. No. Eat yours. You're not allowed to have three of them. It's bad enough you already want two." (said with shame after child tries to take one of mother's cupcakes) – Mother of overweight girl
"Absolutely wonderful, huh? You're happy about that, huh [Child]? Of course you're going to say that's great, huh?" (said with sarcasm as child appears to delight in cupcake) – Mother of normal weight boy
"I really don't want you eating all of that. I really don't want you eating all of that. You haven't had dinner yet. One more bite. One more bite. Yeah, I'm not playing with you. One more bite. You haven't had dinner yet. You're not eating all this junk." (said angrily with negative affect) – Mother of obese girl
"Whoa, simmer down chica. You don't have to be a piggy." (said with hostility) – Mother of obese girl
"Don't you think they're gross? Of course not." (said harshly with sarcasm) – Mother of normal weight boy
"No. Why would you eat both of them? That's gross, [Child]. Whatever. Yeah, this is like a once in... Yeah this does not happen every day, I'm sorry, sir. No." (said with disgust and criticism) – Mother of obese boy
"Are you starving or what? Eh, stop acting like that. Get a napkin and wipe your face off or I'm going to call this off right now if you don't stop. You're acting like a little piglet." (said critically with exasperation after child gets some chocolate on face) – Mother of overweight boy

Table 3
Poisson regression models testing associations between characteristics of the child and mother with counts of maternal restriction.

	Restriction with Positive Affect	Restriction with Negative Affect	Total Restriction
	RR (95% CI)	RR (95% CI)	RR (95% CI)
Child age (months)	1.00 (0.99–1.02)	1.05 (1.02–1.08)*	1.01 (1.00–1.02)
Child sex (male vs female)	1.05 (0.82–1.35)	1.16 (0.73–1.82)	1.08 (0.87–1.35)
Child is obese	1.62 (1.22–2.15)**	3.76 (2.31–6.13)**	1.97 (1.54–2.51)**
Maternal race/ethnicity (non-Hispanic white vs. not)	1.37 (1.01–1.87)*	3.45 (1.70–7.01)**	1.65 (1.24–2.18)**
Maternal education (\leq HS diploma vs > HS diploma)	0.94 (0.73–1.22)	1.89 (1.18–3.01)*	1.10 (0.88–1.38)
Maternal BMI	1.00 (0.98–1.01)	1.00 (0.98–1.03)	1.00 (0.99–1.01)
Maternal depressive symptoms (clinically significant depressive symptoms vs. not)	0.84 (0.64–1.11)	0.87 (0.53–1.43)	0.84 (0.66–1.07)

RR denotes relative rate, CI denotes confidence interval, HS denotes high school, BMI denotes body mass index.

* $p \leq 0.05$.

** $p \leq 0.001$.

tone of maternal restrictive feeding behaviors. The large majority of restrictive statements were positive or neutral in affective tone. Restrictive statements with a negative tone, though uncommon (15.6% of mothers), were notably harsh and shaming. Restriction with Positive Affect (52.7% of mothers) was associated with the child being obese and the mother being non-Hispanic white. Restriction with Negative Affect was associated even more robustly with the child being obese, as well as with the child being older, and the mother being non-Hispanic white and having less education. Restriction of any type was not associated with the child's sex, or the mother's BMI or depressive symptoms.

The finding that more Restriction with Positive Affect was associated with child obesity and maternal non-Hispanic white race/ethnicity is consistent with prior work (Cachelin & Thompson, 2013; Faith et al., 2004) examining restrictive feeding behaviors in general. Our cross sectional design leads to two potential interpretations of this finding. Mothers of obese children may be responding to the child's obesity by trying to guide them gently away from eating excess calories. Alternatively, the restrictive behaviors could be

overriding children's internal cues of satiety, leading to overeating and obesity (Birch & Fisher, 1998). While covert approaches to restriction may be ideal in settings that mothers can control (i.e., keeping certain types of food out of the home or promoting routines) (Jarman et al., 2015; Rollins et al., 2015), the situation mothers faced in this study, in which they were confronted with a potential need to overtly restrict their child's intake, is common. The many ways mothers attempted to dissuade their children from eating the cupcake in neutral or positive tones were notable (i.e., gently recommending they eat just one cupcake, kindly suggesting that the child may be full). Mothers seemed to be seeking an appropriate way to effectively yet kindly restrict their child's intake. Future work is needed to understand how restriction with positive affect is associated with children's intake in the short and long term, and whether or not this is an effective technique to guide children's choices and help promote autonomy in eating in healthy ways.

Perhaps the most salient finding in our study is that mothers of obese children had much higher rates of Restriction with Negative Affect than mothers of non-obese children. This form of restriction,

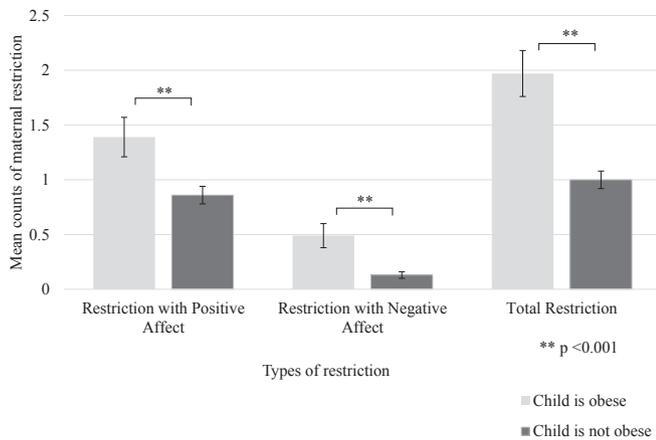


Fig. 1. Mean counts of maternal restriction by child weight status, adjusted for covariates. Means adjusted for child age, child sex, child is obese (vs. not), mother race/ethnicity (white non-Hispanic vs. other), mother education (\leq high school diploma vs $>$ high school diploma), mother's body mass index and maternal depressive symptoms (clinically significant depressive symptoms vs. not).

including name calling, belittling, and shaming has not been described in the literature to date. While mothers of obese children had higher rates of both Restriction with Positive Affect and Restriction with Negative Affect, we hypothesize that the impact of these different statements on the child is likely different. It is possible that parents resort to these harsher, more negative statements after they have attempted gentler forms of restriction, but have found these to be ineffective. It is also possible that the child could be responding to harsh restriction with increased eating. Prior work (Neumark-Sztainer, Falkner, Story, Perry, & Hannan, 2002) has shown that children who are teased about their weight have higher rates of unhealthy eating. The effectiveness of Restriction with Negative Affect in reducing a child's intake, as compared to gentler approaches, is an empiric question that may be an important direction for future work. Is a child less likely to take another bite after they have been harshly shamed? Or are they more likely to take a bite, in an emotional or defiant reaction to the criticism they received? A better understanding of the genesis and effects of these harsh statements is an important direction for future work to inform intervention development. Furthermore, future longitudinal research is needed to understand associations of restriction with negative affective tone with future maladaptive eating behaviors among children.

Guidelines (Barlow & Committee, 2007) recommend that parents avoid restrictive feeding practices. However, during this 4 min episode with two cupcakes, most mothers in our sample, including those of normal weight children, restricted their child's intake at least once. Mothers are engaging in these behaviors despite recommendations to the contrary, likely motivated by the desire to guide their children's eating in a healthful way. In our increasingly obesogenic food environment, it is unrealistic to recommend that mothers avoid restriction, given that their children will inevitably be exposed to inappropriately large portions of palatable, calorie dense foods. Current guidelines, however, do not provide guidance regarding healthy, appropriate ways to restrict children's intake. Mothers need guidance on how to effectively and sensitively restrict their child's intake of unhealthy foods, not to simply be told not to engage in restriction at all. There is a need for research into which types of restrictive approaches may be effective to decrease food intake while not promoting maladaptive eating behaviors. A better understanding of how maternal restrictive statements with positive and negative affect may impact a child's food intake may

inform future interventions and guidelines.

Strengths of this study include a large sample size and the observational nature of data collection. While the laboratory setting of this study provided a carefully controlled environment, it also was a somewhat atypical eating environment, thereby reducing ecological validity. Additional limitations include that the study sample was made up of low-income mothers of early school-aged children from a single geographic location, the majority of whom had white non-Hispanic race/ethnicity, therefore results may not be generalizable to other populations. Finally, the cross-sectional design limits any inferences about temporality or causation. Future longitudinal work is needed to disentangle the association between restrictive feeding behaviors and child obesity taking into account maternal affect.

5. Conclusions

Mothers of obese children had higher rates of Restriction with Positive Affect and Total Restriction than those of not obese children. In addition, mothers of obese children engaged in much higher rates of Restriction with Negative Affect including name calling, shaming and belittling. Future work should consider the impact of maternal restrictive statements with positive and negative affect on children's food intake.

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