Maternal discouragement and child intake of a palatable dessert: A multilevel sequential analysis

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ABSTRACT

Background: Family mealtimes are often marked by parent-child conflict, which may arise when children's eating behaviors do not match parental expectations. Little is known about how children respond to parents' comments to discourage eating.
Objective: The objective of this study was to examine the likelihood of a child taking a bite following a maternal statement to discourage child intake.
Methods: 50 mother-child dyads (mean child age 71.8 months) participated in a laboratory eating task with cupcakes. Video recordings were reliably coded for maternal statements to discourage child intake (varying by domains of affective valence and directness) and child bites. Multilevel sequential analysis was performed to determine differences in pairs' antecedent statement to discourage child intake and a child's discouraged bite.
Results: Children were significantly more likely to be non-compliant by taking a bite following negative (vs. positive), indirect (vs. direct) and negative direct (vs. positive direct) statements to discourage child intake (that is, a "discouraged bite"). There were no differences in children taking discouraged bites following a negative indirect vs. positive indirect statement to discourage child intake.
Conclusions: Children may be more apt to comply with their mother's mealtime commands if they are delivered with a direct approach and a positive affective valence. Future work should examine the longitudinal effects of using positive direct mealtime commands on children's food intake, weight gain and emotional health.

1. Introduction

Family mealtimes are important for promoting children's health and well-being (Fiese, Hammons, & Grigsby-Toussaint, 2012; Patton, Dolan, & Powers, 2006). Recent work has highlighted the importance of a positive emotional context of the family meal (Fiese et al., 2012; Saltzman, Bost, Musaad, Fiese, & Wiley, 2017), however, mealtimes can

often be stressful for both parents and children (Powers et al., 2002; Zeller et al., 2007). Mealtime conflict can arise between parents and children when children's eating behaviors do not match the expectations of their parents. For example, picky eating, overeating, food tantrums or food refusals may contribute to dyadic conflict resulting from the child's non-compliance with the parent's feeding goals. While in the past child compliance has been conceptualized as a trait of an

individual child (Kopp, 1982), other work has highlighted the dyadic interactive nature of compliance, reflecting the parent's approach to control (Kochanska & Aksan, 1995) as well as the style of parent-child communication (Larson, Branscomb, & Wiley, 2006), which may be central to management of mealtime conflicts.

An important aspect of parent-child communication in general is parental affect, defined as the content, warmth and tone of voice (Pesch, Miller, Appugliese, Rosenblum, & Lumeng, 2016). Parental positive affect has been linked to greater child compliance (Blandon & Volling, 2008; Kochanska & Aksan, 1995), whereas harsh or negative affect has been linked with child non-compliance (Crockenberg & Litman, 1990; Granic & Patterson, 2006; Smith, Calkins, Keane, Anastopoulos, & Shelton, 2004). It is hypothesized that a parent's positive affect may be more engaging to a child, promoting their compliance with a task, whereas negative or harsh affect may be more off-putting, thereby promoting less compliance (Sanders, Patel, Le Grice, & Shepherd, 1993).

Extensive prior work in the general parenting literature has found that clear and direct parent commands are associated with more compliance and more positive outcomes for some children (Bernicot & Legros, 1987; Braungart-Rieker, Garwood, & Stifter, 1997). It is hypothesized that children are more likely to respond to direct commands, rather than indirect commands, as it may not be clear what behavior is expected following an indirect command (McNeil & Hembree-Kigin, 2010). More subtle or indirect requests and commands are inherently more ambiguous to interpret (Bernicot & Legros, 1987; Kelly, 2001). However, less is known about if certain types of parental commands are more or less effective for child compliance in the realm of eating behaviors.

Little is known about the effects of parent-child mealtime communication on children's food intake and compliance with parental directives around eating. While parental affect around eating and child mealtime affect has been associated with favorable child outcomes (Fiese et al., 2012; Frankel et al., 2015; Saltzman et al., 2017), no studies to date have examined whether the affective valence of a parent's command to take a bite (or not) affects child compliance. With regard to directness, prior work has investigated parental use of direct and indirect commands with a focus on increasing food intake in children with chronic diseases (Stark et al., 2000). This work found that parents of children with chronic health conditions used more commands (both direct and indirect) to promote food intake, however those children were less compliant overall with parents' mealtime commands than were healthy controls (Stark et al., 2000). Other work (Stough, Gillette, Roberts, Jorgensen, & Patton, 2015) has found that children with autism spectrum disorder were more likely to take a bite after a parent direct command (vs. other mealtime behavior), suggesting that in feeding, as in general parenting, direct commands may be more effective for child compliance.

This prior work has focused on parent commands to encourage child intake, but not those that discourage child intake of junk foods (i.e., low in nutrients while dense in calories, such as cupcakes). A common feeding goal of parents is to limit their child's intake of junk food or desserts (Goulding et al., 2015), however the differential effectiveness of parental statements to discourage children's intake of junk food has not previously been investigated in healthy children. This may have important implications for childhood obesity interventions. No prior work has examined the directness of parental commands to discourage child intake, and no prior studies have examined these differences by child weight status. Lastly, no studies have examined the combination of affect and directness in parent communication around feeding in association with the likelihood of a child taking a bite of food.

1.1. The current study

The current study examined maternal discouragements of child eating, and child subsequent bites in response to maternal

discouragements using a multi-level sequential analysis of mother and child behavior during a videotaped laboratory eating interaction called the Structured Eating Protocol (SEP) (Goulding et al., 2014; M. H. Pesch, D. P. Appugliese et al., 2016; Radesky et al., 2015), described below. Observational analysis of videotaped eating interactions is useful in identifying and isolating behaviors free from distractions common in the home environment (Pesch & Lumeng, 2017). In brief, during the videotaped protocol the mother and child were seated alone at table in a quiet room and were served individual portions of chocolate cupcakes.

Videos were coded for maternal statements to discourage child intake and child bites. Multi-level sequential analyses were used to analyze the likelihood of association between maternal statements to discourage child intake and subsequent child bites (Chorney, Garcia, Berlin, Bakeman, & Kain, 2010; Howe, Dagne, & Brown, 2005). This approach was used to capture child non-compliance, specifically the child taking a subsequent bite following a maternal statement to discourage child intake, which we term a "a discouraged bite", as a function of the mother's affect (positive vs. negative) and directness (direct vs. indirect). We tested the following hypotheses which were informed from the prior literature on parent-child interactions and child compliance: 1) A child would be more likely to take a discouraged bite following a negative (vs. positive) maternal statement to discourage child intake; 2) A child would be more likely to take a discouraged bite following an indirect (vs. a direct) maternal statement to discourage child intake; 3) A child would be more likely to take a discouraged bite following a negative direct (vs. a positive direct) maternal statement to discourage child intake; 4) A child would be more likely to take a discouraged bite following a negative indirect (vs. a positive indirect) maternal statement to discourage child intake. Follow-up analyses explored if these relations were moderated by child's body mass index z-score (BMIz) or maternal body mass index (BMI).

2. Material and methods

2.1. Sample

The sample selected for the study were 50 female primary caregiver-child dyads (mean child age 71.8 months, range of 53.6–83.2 months) from Southeastern Michigan who were originally enrolled as part of a larger longitudinal study from 2009 to 2011 examining contributors to a child's risk of obesity. The original study enrolled (n = 380) caregiver-child pairs utilizing the child's Head Start Program (a free, federally subsidized preschool program for low-income children) to participate in a study related to children's feeding behaviors. 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, foster care, or the mother not speaking English fluently and/or having a four-year college degree. Since all dyads were originally recruited from Head Start, the children were 3–4 years of age and living in low-income families at the time of recruitment. Of the sample in the original study, 95% of the female primary caregivers were biological mothers. The remaining 5% were grandmothers, adoptive mothers and stepmothers; henceforth we refer to the entire group as "mothers."

Approximately two years later, the dyads were invited to take part in a follow-up study, which was described as seeking to understand how mothers feed their children. A total of 296 dyads participated in this follow-up study, which included the SEP, a laboratory-based eating interaction designed to capture children's and mothers' responses to different foods. Dyads were excluded (n = 49) from the 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 further analysis for the

following reasons: 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 final sample of 239 dyads.

Given the complexity and time intensity of the analysis, the decision was made to code and analyze a subset of 50 dyads. Purposive sampling was used to obtain a sample of 50 dyads evenly distributed based on child weight status (25 children with normal weight status (BMI < 85th percentile for age and sex according to Center for Disease Control (CDC) growth charts (Kuczmarski et al., 2000) and 25 children with overweight/obese weight status (BMI ≥ 85th percentile for age and sex according to CDC growth charts (Kuczmarski et al., 2000)). Inclusion criteria for the subsample included that the mothers had measured BMI and had used 3 or more statements to discourage child intake (described below) in the SEP, and that dyads had complete data (*n* = 93). The 25 dyads in each group were then randomly selected for each group based on child weight status from this subsample. Random samples were selected until the two groups were balanced according to child sex, maternal age, maternal race/ethnicity and maternal depressive symptoms.

2.2. Procedure

The University of Michigan and the University of Memphis Institutional Review Boards approved the study, and mothers provided written informed consent, children provided assent and dyads were compensated $60 for their participation. Dyads were invited to participate in the SEP, which has been previously described in detail (Goulding et al., 2014; M. H. Pesch, D. P. Appugliese et al., 2016; Radesky et al., 2015). The entire protocol manual of the SEP has been previously published (Pesch, Miller, Appugliese, Rosenblum, & Lumeng, 2017). The SEP was designed to capture the mother's and child's responses to various foods in a controlled laboratory setting, thereby reducing the variability of home mealtime observations. Each dyad was asked to fast for 2 h prior to the protocol. The dyad was seated at a table alone in a quiet room, where they were videotaped. A research assistant presented both the mother and child with individualized portions of four different foods that were offered one at a time, sequentially, and in randomized order, to the dyad concurrently. Each food was presented individually, and removed after the allotted time period. The mother and child were invited to try the food if they wanted, and then were left alone for 4 min. As described elsewhere (Pesch et al., 2017), each food portion was weighed before and after the protocol to calculate the amount consumed by each participant. The foods varied based on familiarity and sweetness, and included halva (unfamiliar dessert), artichoke (unfamiliar vegetable), chocolate cupcakes (familiar dessert), and green beans (familiar vegetable). This analysis focused only on the 4-min segment in which the chocolate cupcakes (Hostess Chocolate Cupcakes, 104.96 ± 0.5 g, 340 kcal) were presented, as based on prior work (M. H. Pesch, D. P. Appugliese et al., 2016) that these palatable, energy dense desserts would elicit more discouragement from mothers that the other foods. The SEP has shown good test-rest reliability across approximately 2.5 years for discouragements to eat desserts (r = .28) and amount of dessert eaten by the child (r = .24) (P < 0.5 for all statistics reported) (data not shown but available from first author upon request).

2.3. Measures

2.3.1. Maternal statements to discourage child intake

Maternal statements to discourage child intake were measured in the SEP. A coding scheme was previously developed (available from the authors upon request) to reliably capture maternal statements to discourage child intake based on two dimensions, affect and directness, resulting in four categories (positive direct, positive indirect, negative direct, and negative indirect). Affect was defined as mother's affective content and tone of voice during an utterance (M. H. Pesch, A. L. Miller et al., 2016). Direct statements were defined as utterances said by the mother specifically directed to her child about limiting their food intake (Pesch et al., 2017), vs indirect statements, which were defined as utterances that were not directed at the child specifically, but conveyed the mother's indirect disapproval of the child's intake. A positive direct statement was defined as a statement made by the mother with the intent to limit the child's intake that was gentle, kind or guiding in nature, but used a direct command (e.g. "Honey, only eat one cupcake, now"). A positive indirect statement was a statement made by the mother with the intent to limit the child's intake that was gentle, kind or guiding in nature, but used indirect language to communicate her point and was not a direct command (e.g. "We really ought to only eat one"). A negative direct statement was a statement made by the mother with the intent to limit her child's intake that was harsh, belittling or shaming in tone, and was a direct command (e.g. "Don't eat that you pig!"). A negative indirect statement was a statement made by the mother with the intent to limit her child's intake that was harsh, belittling or shaming in nature, and that used indirect language to communicate her intention, not a direct command (e.g. "Cupcakes make us fat!"). Coders were trained to reliability and double coded 20% of the video segments to establish reliability (kappas ranged from 0.76 to 0.95), after which the remaining videos were all coded by a single coder over the course of a month using Noldus Observer XT 11.5 (Noldus, Trienes, Hendriksen, Jansen, & Jansen, 2000).

2.3.2. Child bites

A coding scheme was developed to reliably capture the bites that a child took during the 4-min sequence with the cupcakes. A bite was defined as food touching any part of the mouth including the lips and tongue. Additional criteria for a bite included: licking food off of their hands, plate, table, and silverware; picking up crumbs and eating them (with each individual crumb representing a bite); taking a bite and then spitting it out; food falling out of the child's mouth and then immediately replacing it (one not two bites); shoving food in their mouth and then proceeding to take multiple small bites to manage the large piece of food without breaking the plane between their mouth and the cupcake (one bite); and taking rapid bites in succession with the plane between their mouth and the cupcake breaking (each time food newly entering their mouth represented a bite). The following were not defined as a unique bite: chewing; taking a bite and then using their finger (s) to push the cupcake into their mouth; placing an empty utensil in their mouth; moving the cupcake toward their mouth without any oral contact; smelling the cupcake; and drinking water.

If the child's mouth was not visible due to slouching under the table, the child was out of frame of the camera, or any other reason that made it unclear whether the child was taking bites from the cupcake these were coded as uncodable. Two raters independently coded 20% of the video segments. Cohen's kappa = 0.95. Once reliability was established, the remainder of the videos were coded by a single coder, who was blinded to study hypotheses, over a two-week period.

2.3.3. Dyad characteristics

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

Height and weights 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 ≥ 95th percentile for age and sex) or not obese (BMI < 95th percentile for age and sex), additionally

children's BMIz were calculated, all based on the United States Center for Disease Control and Prevention growth charts (Kuczmarski et al., 2000).

2.4. Statistical analysis

Bivariate analyses were conducted to examine differences in child and mother characteristics based on child weight status (normal weight vs. overweight/obese).

A child "discouraged bite" was defined as coded when a child took a bite in the 5 s following a maternal statement to discourage child intake. A multilevel (log-linear) statistical approach was used to examine observed sequences of parent-child mealtime interactions (Dagne, Howe, Brown, & Muthén, 2002; Howe et al., 2005). Contrast codes were used to determine differences in pairs of antecedent statements to discourage intake (negative vs. positive, indirect vs. direct, negative direct vs. positive direct, and negative indirect vs. positive indirect) as antecedents of a child's discouraged bite response. For example, when comparing a negative (coded as −1) vs. positive command (coded as 1), estimates could range from 1 to −1. An estimate of zero reflects an equal ratio of positive indirect and negative indirect antecedents, positive estimates reflect proportionally more positive indirect statements, and negative values reflect proportionally more negative indirect statements (Wickens & Olzak, 1989).

3. Results

Bivariate comparisons of characteristics of the groups of child with overweight or obese weight status vs. children with normal weight status are shown in Table 1, and demonstrate that children with overweight/obesity ate more grams of cupcake ($p = .0001$, $d = 1.77$), and had mothers with higher average BMI than children with normal weight ($d = 0.74$). With regard to maternal statements to discourage child intake, unadjusted bivariate analyses showed that mothers of children with overweight or obesity used more statements with negative affect

Table 2
Multilevel sequential analysis predicting a discouraged bite (coded as −1 vs. 1).

Command Type Comparison	Estimate	S.E.	Est./S.E.	p-Value
Indirect vs direct	−0.065	0.030	−2.193	.028
Moderated by child BMIz	0.018	0.022	0.809	.418
Moderated by maternal BMI	0.002	0.003	0.584	.559
Negative vs positive	−0.091	0.035	−2.602	.009
Moderated by child BMIz	0.021	0.027	0.785	.433
Moderated by maternal BMI	0.002	0.003	0.782	.434
Negative direct vs positive direct	−0.099	0.039	−2.518	.012
Moderated by child BMIz	0.046	0.034	1.346	.178
Moderated by maternal BMI	0.005	0.004	1.112	.266
Negative indirect vs positive indirect	−0.054	0.043	−1.272	.203
Moderated by child BMIz	−0.001	0.035	−0.028	.978
Moderated by maternal BMI	0.001	0.004	0.140	.888

BMI signifies Body Mass Index, BMIz signifies Body Mass Index z-score.

($p = .049$, $d = 0.57$) than mothers of children with normal weight status. There were no differences in use of statements with positive affect alone, or directness alone. When maternal statements to discourage intake were examined with the combination of affect and directness, mothers of children with normal weight status (vs. overweight or obese) used more positive indirect statements ($d = 0.57$), whereas mothers of children with overweight or obesity used more negative direct statements to discourage child intake ($d = 0.61$).

Results of the multilevel sequential analysis are shown in Table 2. Child discouraged bites were more likely to follow negative statements compared to positive statements (hypothesis 1: estimate = −0.091, $p = .009$), indirect statements compared to direct statements (hypothesis 2: estimate = −0.065, $p = .028$), and negative direct statements compared to positive direct statements (hypothesis 3: estimate = −0.099, $p = .012$). There were no differences in children taking discouraged bites following a negative indirect vs. positive indirect statement to discourage child intake (estimate = −0.054, $p = .203$). The associations between statements to discourage child

Table 1
Participant characteristics and differences by child weight status, $N = 50$.

	Entire sample $N = 50$	Child with normal weight ($N = 25$)	Child with overweight or obesity ($N = 25$)	p-value
	N (%) or mean (± SD)	N (%) or mean (± SD)	N (%) or mean (± SD)	
Child characteristics				
Sex (child is male)	26 (52.00)	13 (52.00)	13 (52.00)	1.00
Age (months)	71.82 (7.47)	71.42 (7.10)	72.23 (7.95)	.71
Child weight status				
Obese	17 (34.00)	0 (0.00)	17 (68.00)	.0001
Overweight	8 (16.00)	0 (0.00)	8 (32.00)	
Normal weight	25 (50.00)	25 (100.00)	0 (0.00)	
Amount cupcake eaten (g)	57.02 (25.84)	34.25 (8.64)	68.26 (25.72)	.0001
Number of bites	50.5 (19.5)	45.2 (16.7)	55.8 (20.6)	.051
Mother characteristics				
Age (years)	31.83 (7.59)	29.06 (6.20)	29.4 (5.55)	.84
White non-Hispanic race/ethnicity (vs other)	39 (78.00)	20 (80.00)	19 (76.00)	.73
Highest level of education achieved ≤ HS diploma	25 (50.00)	10 (40.00)	15 (60.00)	.16
Depressive symptoms ≥ 16 on the CESD:	14 (28.00)	5 (20.00)	9 (36.00)	.21
BMI	32.15 (8.85)	29.06 (6.20)	35.25 (10.09)	.017
Maternal statements to discourage child intake				
Affect (count):				
Positive	3.88 (1.69)	4.00 (1.80)	3.76 (1.59)	.95
Negative	0.92 (1.59)	0.48 (0.82)	1.36 (2.02)	.049
Directness (count):				
Direct	3.20 (2.45)	2.56 (2.02)	3.84 (2.70)	.067
Indirect	1.60 (1.23)	1.92 (1.35)	1.28 (1.02)	.065
Affect and directness (count)				
Positive direct	2.44 (1.77)	2.24 (1.81)	2.64 (1.75)	.55
Positive indirect	1.44 (1.16)	1.76 (1.23)	1.12 (1.01)	.05
Negative direct	0.76 (1.49)	0.32 (0.75)	1.20 (1.89)	.036
Negative indirect	0.16 (0.42)	0.16 (0.47)	0.16 (0.37)	1.00

HS denotes high school, CESD denotes Center for Epidemiologic Studies Depression scale.

intake and children's discouraged bites were not moderated by child's BMIz or mother's BMI (*p* range = .18 to .98).

4. Discussion

This study adds several new findings to the literature using novel methodology and expands prior work around dyadic feeding interactions. First, this study examined the association of a mother's statement to discourage her child's intake with the likelihood of a child taking a discouraged bite with respect to her affect and her directness in isolation, as well as the combination of both affect and directness. Using observational coding to capture moment-to-moment parent-child interactions, this study found that children were more likely to take a "discouraged bite" of cupcake following certain types of statements from their mothers. This study may suggest that certain statements may be less effective than others in discouraging children's intake of a cupcake. A child's discouraged bite was more likely to follow a negative (vs. positive), indirect (vs. direct) and negative direct (vs. positive direct) statement to discourage intake. There was no difference in the likelihood of a child taking a discouraged bite following a negative indirect (vs. positive indirect) statement to discourage intake. Our findings are consistent with those of other studies that have found that children's responses to maternal feeding commands may differ based on the *nature* of the mother's feeding command (i.e., affective valence or directness). This study expands prior work through a micro- (moment-to-moment) level analysis of child eating behaviors in response to maternal statements to discourage child intake.

When examining the affective valence of mother's statement to discourage her child's intake, it is notable that children were more likely to be non-compliant in response to a statement with negative affect. Prior work (Blissett, Haycraft, & Farrow, 2010) has hypothesized that overeating may be encouraged through negative emotional context of feeding interactions. Following a negative direct statement, a palatable food may be more reinforcing to the child than complying with the parent's command. Other work (Hughes et al., 2011) has found that parents with high demandingness and authoritarian feeding styles have high mealtime negative affect in general, but this prior work has not examined the child's intake in response to the nature of a specific prompt. While our work did not specifically examine the likelihood of a child not taking a bite, it may be posited that the inverse of our findings may be true. Specifically, a parental statement with positive affect may be more effective than a statement with negative affect in discouraging child intake. This hypothesis fits well within the framework of responsive feeding, in which a parent creates a predictable and nurturing feeding context by responding to a child's cues and scaffolding their eating in a supportive and developmentally appropriate manner, thereby promoting predictable child responses (Black & Aboud, 2011). Parental messaging given in a neutral-to-positive tone may be more engaging to the child, rather than off-putting, making a compliant response more likely. Simply put, children may be more likely to comply with commands when they feel respected, supported, and encouraged, rather than shamed, belittled, criticized, and/or coerced (Sanders et al., 1993). In addition, the authors hypothesize that a positive affective valence to parent-child communication around food may have more protective and positive effects on children's long-term self-esteem, eating behaviors and body image. Prior work (Eisenberg, Neumark-Sztainer, & Story, 2003) in adolescents has found that negative weight-based talk from family members is associated with body dissatisfaction and poor emotional health outcomes.

This study also found that children were more likely to take a discouraged bite following an indirect statement from their mothers, which aligns with the authors' hypothesis. Children may find indirect statements to be more ambiguous and difficult to understand. With regard to feeding, it has been hypothesized that direct commands are also more effective than indirect commands (Stark et al., 2000), although this is the first study to test this hypothesis by comparing direct

and indirect statements to discourage intake. The authors hypothesize that parents who feel a greater urgency to reduce their child's intake of unhealthy foods may resort to more direct commands in order to get their child to stop eating an energy dense/low nutrient food.

There may be important implications of these results with regard to childhood obesity interventions as maternal feeding practices are hypothesized to be modifiable targets for obesity interventions. Our study did not find a difference in the effectiveness of maternal statements on discouraging children's intake based on child BMIz or maternal BMI, however this may be due to our relatively small sample size. Mothers use a variety of approaches to attempt to modulate their child's food intake (Rhee et al., 2015), including restriction, which is defined as a mother's efforts to limit the total amount of food consumed by her child (Birch et al., 2001). Guidelines (Daniels & Hassink, 2015; Gidding et al., 2006) recommend that parents avoid overly restrictive feeding practices, due to concern 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. Despite this hypothesis, the research linking restriction and risk of childhood obesity is remarkably conflicting, with studies finding more maternal restriction associated with an increased (Faith, Scanlon, Birch, Francis, & Sherry, 2004; Jansen et al., 2012), decreased (Campbell et al., 2010) or no difference in risk of child obesity or overweight. Some studies have found that maternal restriction is associated with more child obesogenic eating behaviors, including greater eating in the absence of hunger (Rollins, Loken, Savage, & Birch, 2014), food responsiveness (Carnell, Benson, Driggin, & Kolbe, 2014; Jansen et al., 2012; Webber, Cooke, Hill, & Wardle, 2010), and emotional overeating (Haycraft & Blissett, 2012). Despite this literature and the resulting practice guidelines, mothers continue to frequently restrict children's food intake (M. Pesch et al., 2016). The authors propose there may be some situations in which mothers may need to provide sensitive guidance around the quantity of their children's food intake. Therefore, in those situations, using a positive direct approach may be not only the most effective for dissuading intake, but also the most sensitive. These results could guide how to sensitively moderate children's intake to promote their health and well-being in an obesogenic environment.

It should also be considered that the effectiveness of maternal statements to discourage their child's intake may be related to their timing in meal or eating situations. For example, a child may be more likely to respond to a maternal discouragement by not taking a bite after the child had been eating for some time, and was therefore more satiated. It may be that the timing, and not affect or directness, of a mother's statement to discourage her child's intake may result in greater compliance. Future studies should examine the timing of maternal statements to discourage child intake, in addition to a mother's affect and directness on the association with subsequent child bites of a palatable dessert.

This study is not without limitations, and results may not be generalizable to other populations, including interactions with other caregivers and fathers. Furthermore, results may not be generalizable to mothers who do not discourage their child's intake frequently. Other work should examine children's responses to mothers' discouragement of intake in mothers who discourage infrequently. Future directions for this work include examining effectiveness of maternal feeding behaviors in larger free-living environments with different foods, as well as the effects of a mother's approaches to discourage her child's intake on the child's long term weight gain, eating behaviors, body image and self-esteem. Additional work exploring both mother's and father's responses to a child's compliance or non-compliance (e.g., praise, acknowledgement, or consequence) will be important for a more nuanced understanding of dyadic feeding interactions.

5. Conclusions

Children were more likely to take a discouraged bite following statements from their mothers that were negative (vs. positive), indirect (vs. direct) or negative direct (vs. positive direct). Positive direct statements to discourage child intake may be most effective for child compliance and warrant further investigation. Future work should further examine children's responses to different statements to discourage eating, investigating the child factors that may be associated with an effective command to stop eating, in addition to long term correlates such as emotional health, well-being and weight gain.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.appet.2018.07.013.

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