2023

Relation between parent feeding and emotional overeating in preschoolers as mediated by emotion regulation

Lindsay Nicole Baker
University of North Florida, lindsaynbaker3@gmail.com

RELATION BETWEEN PARENT FEEDING AND EMOTIONAL OVEREATING IN PRESCHOOLERS AS MEDIATED BY EMOTION REGULATION

By

Lindsay Baker

A thesis submitted to the Department of Psychology

In partial fulfillment of the requirements for the degree of

Master of Science in Psychological Science

UNIVERSITY OF NORTH FLORIDA

COLLEGE OF ARTS AND SCIENCES

April 2023

TABLE OF CONTENTS

List of Tables/Figures

Abstract

Emotional overeating is defined as eating in response to negative emotions, and the shift from emotional undereating to overeating around the preschool years indicates environmental influences. Parent feeding practices such as using food to regulate emotions and behavior may impede children's ability to regulate their emotions, leading to emotional overeating. This study analyzed the relation between parent feeding practices, child emotion regulation, and emotional overeating in 4- and 5-year-old children. For study 1, mothers of 4- and 5-year-old children completed online questionnaires through MTurk and Prolific. Questionnaires measured parent feeding practices, emotion regulation, and emotional overeating. Parent use of food to control emotions and behaviors was positively correlated with emotional overeating. Additionally, parent use of food to control emotions and behavior predicted higher levels of emotional overeating, and this was independently mediated by Child Emotion Regulation and Child Lability/Negativity. Study 2 was a pilot study examining the feasibility of an fNIRS emotion regulation task in preschool children. Outcome variables included whether children could complete the task, their accuracy across conditions, and the fNIRS signal quality during the task. Although more data needs to be collected to determine whether both 4 year-old and 5 year-old children can complete the task, these initial data indicate that adequate signal quality can be obtained when using fNIRS in preschool samples. Overall, this study sheds light on potential environmental influences and parenting practices associated with emotional overeating in preschool children.

Relation between Parent Feeding and Emotional Overeating in Preschoolers as Mediated by Emotion Regulation

Emotional overeating can be defined as the tendency to overeat to manage positive and negative emotions (van Strien et al., 2007). While emotional overeating can be a response to positive emotions, it generally involves eating in response to negative emotions such as stress (Michels et al., 2012), depression (Lazarevich et al., 2016), and frustration (Arnow, Kenardy, & Agras, 1995). Negative emotions typically act to decrease food intake (Levine & Morley, 1981); however, rats have shown a tendency to increase their food intake under stress when they are in a palatable food environment (Dallman et al., 2003). Humans demonstrate a similar pattern of increased consumption, especially in western societies where energy dense, highly palatable foods are readily available (Epel, et al., 2004). Further, young children tend to engage in more emotional undereating (Wardle et al., 2002), with emotional overeating becoming more prevalent in children ages 5-13 years, which suggests that this may be a learned behavior (Farrow et al., 2015).

Emotional overeating in children has been associated with greater consumption of sweet and fatty foods (Camilleri et al., 2014), greater frequency of snacking (O'connor et al., 2008), and the development of eating disorders later in life (Masheb & Grilo, 2006; Goossens et al., 2009). Children who engage in emotional overeating may also have higher BMI (Sweetman et al., 2011; Wilson et al., 2015; Braet & Van Strien, 1997; Webber et al., 2009; Geliebter & Aversa, 2003), though this relation is not consistent (van Strien & Bazelier, 2007; van Strien & Oosterveld, 2008, Wardle et al., 1992).

While there is still uncertainty around emotional overeating and weight status (Adriaanse et al., 2011; Michels et al., 2012), emotional overeating has been correlated with perceptions of

food intake and body image (Adriaanse et al., 2011; Wardle et al., 1992). Additionally, in overweight and obese adults, eating in response to depression was related to psychological well-being, emotion regulation, and eating disorder symptoms (Braden et al., 2018). Together, these findings highlight the potential for emotional overeating to manifest into more severe eating disorders and psychological problems later in life. Therefore, understanding the mechanisms behind this shift from the typical stress response to a response characterized by overeating is essential in implementing strategies for emotion regulation and coping, promoting healthy eating habits, and protecting against eating disorders.

Emotional Overeating and Parent Feeding

When children are young, parent influence has the largest impact in the feeding environment, making parent feeding integral in teaching children how to eat and respond appropriately to their internal hunger and satiety cues (Kröller & Warschburger, 2008). According to the ecological systems theory, proximal processes are the consistent and direct interactions between the developing individual and their environment over an extended period of time (Bronfenbrenner & Morris, 2007). The parent-child relationship is one such proximal process, as young children are consistently interacting with their parents throughout infancy and early childhood. Parent feeding styles and practices play an important role in the development of child eating habits, and feeding may be a contributing factor to childhood obesity (Anzman-Frasca et al., 2012; Rodgers et al., 2014). Accordingly, parent feeding may teach the child both adaptive and maladaptive eating habits and could contribute to the learned behavior of emotional overeating. Understanding how parent feeding interacts with child eating patterns is necessary in delineating various causes and interventions to future maladaptive eating habits and weight gain.

Parents influence their child's eating habits through their parenting styles and through their more specific feeding practices (Braden et al., 2014). Parenting styles differ from parent feeding practices in that parenting styles describe more general parent-child interactions, both within and outside the feeding environment (Patrick et al., 2013). For example, responsive parenting is a reciprocal process between the child and parent that creates emotional attachments and trust between the pair (Kim & Kochanska, 2012; Ainsworth et al., 1979). This process occurs in every domain of parent-child interactions, but in the feeding environment this can include pleasant feeding, being emotionally supportive, and responding to the child's hunger and satiety cues (Engle et al., 2000). Conversely, nonresponsive feeding includes control either by the child or the parent, and a lack of reciprocity between the pair (Black & Aboud, 2011). Nonresponsive feeding can negatively impact the development of eating habits in children. For example, children with parents who minimize negative affect are more likely to engage in emotional overeating (Topham et al., 2011).

Conversely, feeding practices can be classified into three broad constructs: coercive control, structure, and autonomy support (Vaughn et al, 2016). The construct of coercive control in the feeding environment is defined as parenting practices that involve pressure, intrusion, and dominance over the child's feelings, thoughts, and behaviors. These feeding practices tend to be characterized as nonresponsive. Two specific parenting practices that fall under coercive control are using food to control behavior and using food to control negative emotions. Using food to control behavior refers to parents' use of food to reward or encourage certain behaviors. This is also referred to as use of food as a reward or instrumental feeding and may be associated with child emotional overeating later in life (Farrow et al., 2015). For example, children whose parents use food as a reward at ages 3-5 years ate more calories when exposed to a mood

induction task two years later, compared to children whose parents did not use food as a reward (Farrow et al., 2015). Additionally, using food as a reward has been associated with lower intake of fruits and vegetables (Kroller & Warschburger, 2008).

Using food to control negative emotions also falls under the category of coercive control and refers to parent's use of food to soothe or calm their children when they are upset, angry, bored, or fussy, rather than using other ways to teach children to cope with their emotions (Vaughn et al., 2016). This is also described as emotional feeding and has been positively associated with emotional overeating in children (Blissett et al., 2010; Rodgers et al., 2014). For example, when preschoolers were put in a negative mood by researchers, the children whose parents engaged in emotional feeding ate more sweet and fatty foods compared to the children whose parents did not use this practice (Blissett et al., 2010). Additionally, parental emotional feeding at age six predicted emotional overeating in those same children at age eight (Steinsbekk et al., 2018), and emotional feeding practices have been associated with higher levels of child emotional overeating after one year (Rodgers et al., 2014). Over time, these maladaptive feeding practices characterized by high demandingness create unhealthy proximal processes between the mother and child, which can have long-term consequences on a child's learned eating behavior. Therefore, it is important to understand how and why these feeding practices override children's natural eating response to negative emotions, so that we may prevent emotional overeating and further development of eating disorders.

Emotion Regulation as a Mediator between Parent Feeding and Emotional Overeating

Emotion regulation, defined as the ability to control the valence, intensity, or length of an emotion (Thompson, 1994), has been observed in infants in the form of gaze aversion and proximity seeking (Rothbart et al., 1992). Further, toddlers demonstrate self-awareness and

attempts to alleviate negative feelings (Grolnick et al., 1996; Kopp, 1989). However, emotion regulation shows marked improvements and is of greater importance during the preschool age as children begin school and interact with their peers (Carlson & Wang, 2007). During this time, children develop the capacity to understand their emotions and inhibit dominant responses (Carlson, 2005), making this time integral to the development of emotion regulation later in life.

Preschool-aged children are also making advancements in cognitive skills such as cognitive reappraisal (Sala et al., 2014). Three-year-old children have demonstrated the ability to change their way of thinking to regulate their emotional response to a stimulus (Mischel & Baker, 1975). This is an important skill for preschool children, as it can impact social interactions and their cognitive competence. For example, the inability to control negative emotions can hinder social interactions and may lead to poorer social outcomes (Denham et al., 2002; Underwood et al., 1992), while effective emotion regulation is associated with positive outcomes such as higher cognitive performance and academic success (Blair 2002). Additionally, emotional reactivity predicted poorer eating regulation in second and third grade children (Harrist et al., 2013), indicating a relation between emotion regulation and eating regulation. Therefore, emotion regulation may also play a role in the development of emotional overeating in children.

The Role of Parenting in Emotion Regulation

According to Eisenberg's theory of parental socialization of emotion, parents' socialization behaviors impact their children's emotional states and how they learn about emotions (Eisenberg et al., 1998). This socialization begins in infancy with warmth and responsiveness and develops, along with language, into more teaching and coaching in the preschool years (Cassidy, 1994; Eisenberg et al., 2001). While children undergo further

socialization from their peers, parents are still the most prominent source of socialization during preschool (Bandura, 2001). Therefore, the parent-child proximal processes in infancy and early childhood shape the trajectory of emotional development as the child transitions into school, as children look to their parents to help them cope with their emotions (Eisenberg et al., 2010).

Parental socialization interacts with parenting styles and is related to various child outcomes such as academic achievement (Moed et al., 2017) and psychopathology (Johnson et al., 2017). Children display positive emotion regulation strategies when their mothers engage in more effective emotion regulation modeling (Bandura, 1977; Bandura et al., 1963). Further, parents who engage in more responsive strategies, such as providing positive feedback and adjusting their engagement to fit their child's needs, have children with higher emotion regulation skills (Lincoln et al., 2017; Silverman & Ippolito, 1995), indicating that socialization strategies and responsive parenting can positively impact child emotion regulation.

Parental influence and socialization may also act to decrease child regulation skills within the feeding environment (Johnson & Birch, 1994). The psychosomatic theory explains emotional overeating as the result of early learning, and the use of non-responsive feeding practices teaches children inappropriate eating behaviors such as emotional overeating (Bruch, 1973). By engaging in higher emotional overeating, the child loses their ability to regulate and identify their emotions as they begin to associate negative emotions with hunger (Bruch, 1973; Hawkins & Clement, 1984). Parent feeding may play a role in this early learning. For example, restrictive feeding practices have been found to disrupt children's ability to attend to their physiological hunger cues, thereby promoting external and emotional eating (Birch & Fisher, 1998). Additionally, several studies have postulated the use of emotional feeding as a way of decreasing children's emotion regulation, eating regulation and attention to satiety cues (Birch et al., 1982;

Wardle & Carnell, 2007; Sleddens et al., 2010; Wardle et al., 2002; Aldao et al., 2015). When parents engage in these practices that are not appropriately responsive to either the child's hunger and satiety cues or to their child's emotional states, they impede on their children's ability to independently regulate their hunger, which can lead to overeating in response to external cues such as emotions (Birch et al., 2003, Sinton & Birch, 2005).

The Role of Emotion Regulation in Emotional Overeating

While it is known that emotion regulation impacts children's social and cognitive outcomes, there is less information on its role in childhood emotional overeating. Emotion regulation has been associated with eating disorders such as loss of control eating (Combs et al., 2011), and binge eating disorder (Svaldi et al., 2014) in adolescents and adults, though there is little research on this relation in children. However, in children, self-regulation is negatively correlated with overweight and poor eating habits (Francis & Susman, 2009; Power et al., 2016). For example, children between 3 and 12 years old gained more weight over time when they scored lower in emotion regulation skills compared to children with higher emotional regulation skills (Francis & Susman, 2009), though this was not due specifically to emotional overeating. Additionally, children who engage in higher self-regulation and less reactivity demonstrate less emotional and external eating (Steinsbekk et al., 2018). Given this, emotion regulation skills seem to play a role in weight gain and emotional overeating, however, the mechanism and direction of this relation needs to be further examined in preschool-aged children. Additionally, understanding the role that emotion regulation plays in the parent-child feeding environment is important to provide effective preventions of emotional overeating.

Neural Correlates of Emotion Regulation, Eating Regulation, and Emotional Overeating

Emotion Regulation

In addition to the behavioral improvements that occur during the preschool years, development of the prefrontal cortex, such as volume, thickness, and white matter, increases significantly during this time (Giedd et al., 1999). Specifically, activation of the dorsolateral prefrontal cortex (dlPFC) has been observed during executive function and cognitive reappraisal tasks (Molavi et al., 2020), cognitive flexibility and irritability (Li et al., 2017), and attention and task-shifting (Gross, 1998; Moriguchi & Hiraki, 2009). For example, activation of the dlPFC has been observed in children ages 8-11 years during a number sorting task regardless of performance, indicating that this region may play a role in executive function (Wood et al., 2009).

While it is clear the dlPFC plays a role in emotion regulation, there are inconsistencies in the direction in which they are correlated. Perlman and colleagues (2014) found that typically-developing children with lower frustration tolerance showed higher activation of the lateral prefrontal cortex during an emotion regulation frustration task. This indicates that there is recruitment of this region during emotion regulation, and that children with lower emotion regulation skills may utilize this region more than those with better emotion regulation skills. However, other studies have found higher activation of the dlPFC associated with better emotion regulation during emotion regulation tasks in children. For example, a functional near-infrared spectroscopy (fNIRS) study using a dimensional change card sort task found that children ages 3 to 4 years showed increased dlPFC activation while changing mental sets, and this activation increased as performance improved (Moriguchi et al., 2009; Moriguchi and Hiraki, 2011). Further, fMIRI imaging showed decreased activation of this region during the processing of negative emotional stimuli in individuals with bipolar disorder; a disorder characterized by emotional dysregulation (Schulze et al., 2016). These studies suggest that increased regulation

skills positively correlate to increased activation of the dlPFC, whereas the study by Perlman and colleagues (2014) observed activation in the opposite direction. Therefore, it will be necessary to determine the direction of the relation between the dlPFC and child emotion regulation to better understand this mechanism.

Eating Regulation

The systems involved in emotion regulation may overlap with the those involved in eating regulation. Eating regulation can include both metabolic and nonmetabolic factors, such as external food cues, cultural beliefs, and emotional states (Godet et al., 2022). Nonmetabolic factors often engage the prefrontal cortex, amygdala, and ventral striatum, and can influence food intake through cognitive control, rather than physiological and metabolic needs (Berthoud, 2011). For example, the hedonic regulation loop utilizes the amygdala, hippocampus, posterior cingulate cortex, and the dlPFC (Hollmann et al., 2013). Further, the ventral medial prefrontal cortex is involved in valuation and food decision making (Schmidt et al., 2018), as well as in food related motivation (Petrovich et al., 2007). This process of using nonmetabolic mechanisms to control food intake is characterized by top-down processing, which is controlled by the prefrontal cortex and is utilized in emotion regulation (Donofry et al., 2016). Activation of the prefrontal cortex and amygdala during eating suggest the possibility of shared mechanisms between eating regulation and emotion regulation, however, how these mechanisms work together to influence emotional overeating in children is still unknown.

Emotional Overeating

Emotional overeating is related to eating regulation and has been associated with activity in prefrontal regions of the brain associated with self-control (Wood et al., 2016). Specifically, emotional eating was related to higher activation of the dlPFC in high calorie GO trials in a

Go/No Go task (Wood et al., 2016). As the dlPFC is associated with self-control and goal-directed behavior, these results indicate that emotional overeating and emotion regulation may have similar neural and cognitive mechanisms. Conversely, individuals higher in stress showed decreases in connectivity between the dlPFC and the ventral medial prefrontal cortex (vmPFC) when choosing between healthy and tasty food options (Maier et al., 2015), which could potentially reflect a decrease in dlPFC activation. Additionally, individuals with high chronic stress have lower activation of the dlPFC in response to high calorie foods (Tryon et al., 2013). These studies further demonstrate the inconsistencies in the literature regarding the direction of dlPFC activation and how this activation relates to emotional overeating.

Activation of the prefrontal cortex may increase with the development of this region. Adults have been found to engage the dlPFC more during deliberate emotion regulation (Ochsner et al., 2004), an effect that is also found in children, although to a lesser extent (Silvers et al., 2017). This activation seems to increase as development of the prefrontal cortex continues through childhood (Giedd, 2004; Gogtay et al., 2004). In a study aimed at improving children's deliberate emotion regulation, scaffolding was shown to increase the lateral prefrontal cortex, indicating improvement in emotion regulation (Grabell et al., 2019). Further, children who were rated higher in emotion regulation to start showed the largest increase in this area (Grabell et al., 2019). This reflects a potential bidirectional relationship between emotional regulation and environmental influence. While children with higher emotion regulation capabilities have higher activation of the prefrontal cortex, it is possible to increase the activation of this region by teaching, as preschoolers have high neural plasticity of the prefrontal cortex (Giedd et al., 1999). There is little research highlighting the effects of parent feeding on the dlPFC but given the plasticity of the brain during the preschool years and the influence environment plays, it is

reasonable to expect that parent feeding could impact children's emotion regulation skills and the activation of the dlPFC during food choice.

Current Study

The preschool years are a time characterized by increasing autonomy and emotion regulation as children transition from the home to the school environment. The high levels of plasticity during this time highlight the importance of the parent-child proximal processes that could be involved in in the shift from emotional undereating to emotional overeating in children. Specifically, the use of food by parents to control their child's emotions and behavior, rather than to teach them appropriate coping and emotion regulation strategies, may impact the child's ability to regulate and control their own emotions and attend to their hunger cues independently, subsequently resulting in increased emotional overeating. Therefore, the child's emotion regulation may mediate the association between the parent's use of emotional feeding and the child's emotional overeating, which may be related to the activation of brain regions such as the dlPFC. The autonomy and rapid development of emotion regulation at the preschool age, and the proximal processes defining children's lives up until this point make this time ideal for investigating the effect of parent practices on child emotion regulation.

The primary aim of the current study is to investigate the relationship between the parenting feeding practice of coercive control with both emotion regulation and emotional overeating in 4 and 5-year-old children (Study 1). The first hypothesis is that parenting feeding practices involving the use of food to control their child's negative emotions and regulate their behavior will predict greater emotional overeating in the child. The second hypothesis is that the association between emotional feeding and emotional overeating will be mediated by the child's emotion regulation skills. That is, parent's use of food to control their child's negative emotions

and behaviors will decrease the child's emotion regulation abilities, which in turn will predict higher levels of emotional overeating in the child.

Study 2 is a pilot study aimed to assess the feasibility of collecting fNIRS data during a task designed to measure dlPFC activity associated with emotion regulation in 4- and 5-year-old children. Both the child's performance during the fNIRS task and the quality of the fNIRS signal were considered. Feasibility outcomes included whether children could complete the task, their accuracy across conditions, and the fNIRS signal quality during the task. These precautions are important for ensuring clean and measurable data for future studies. I expect that children will complete the task with a high accuracy rate across conditions. I also expect that we will have good signal quality for all the fNIRS channels.

Method

Study 1: Online Parent Report Questionnaire Study

The first study was a correlational, cross-sectional study analyzing the relation between parent feeding practices characterized by coercive control and emotional overeating in 4 and 5-year-old children. In this study, I also examined emotion regulation as a mediator in the association between coercive feeding and emotional overeating. All data were collected through online parent report questionnaires, and all analyses were performed through SPSS.

Participants

Mothers of 4 and 5-year-old children were recruited from the online survey sites Amazon Mechanical Turk (MTurk) and Prolific. There were 176 participants recruited from MTurk, and 100 participants recruited from Prolific. An a-priori power analysis suggests that to detect an effect of 0.25 with a power of 0.8, a sample size of 250 would be needed, and I recruited a combined total of 276 mother-child dyads in this study. MTurk and Prolific data were cross

checked for systematic differences in sample descriptives and for data quality and then merged into one composite data set. The MTurk sample and Prolific sample differed significantly in terms of child age and race, and in terms of mothers' education level, marital status, and income. The data also differed for parent feeding variables, child emotional overeating, and child emotion regulation. Comparisons of demographic data between MTurk and Prolific samples can be found in Table 1. Data were excluded from analysis for participants who completed the survey in less than 400 seconds (n=8), did not meet the requirements of the study (mother of a 4- or 5-year-old; n=6), answered the attention checks incorrectly (n=11), or took the survey more than once (n_7=7). This study will focus on typically developing children, so data was excluded if children had confirmed autism spectrum disorder or ADHD (n=8), and if gestational age was less than 32 weeks (n=15).

The final sample included 221 mothers between the ages of 23 and 64 (M=34.74, SD=5.68), with 4 and 5-year-old children (M=5.22, SD=.50). Prolific guidelines restrict asking for children's exact birthdates, therefore, only the birth month and birth year were reported. Age was then estimated using the reported birth month and year. There were 98 (44.3%) children reported as male at birth, and 123 (55.7%) children reported as female at birth. The sample included 5 (2.3%) mothers who identified as American Indian, Alaska Native and/or indigenous, 2 (0.9%) as Asian or Asian American, 9 (4.1%) as African American or black, 8 (3.6%) as Latino/a/x or Spanish origin, 186 (84.2%) as white, and 12 (5.0%) who identified as more than one race/ethnicity (Table 1).

Table 1

Sample Characteristics and Comparisons between MTurk and Prolific Samples

***n*(%) or Mean (*SD*)**	**MTurk (*n*=136)**	**Prolific (*n*=85)**	***t*-value**	**χ^2**
Sample Characteristics				
Mother's Age (years)	34.14 (6.29)	35.27 (4.64)	-1.43	
Child's Age (years)*[a]	5.43 (.29)	4.90 (0.58)	8.91*	
Child's biological sex				0.56
Male	63 (46.3%)	35 (41.2%)		
Female	73 (53.7%)	50 (58.8%)		
Mother's Race/Ethnicity				6.38
American Indian, Alaska Native, or Indigenous	4 (2.9%)	1 (1.2%)		
Asian or Asian American	2 (1.5%)	0 (0.0%)		
Black or African American	7 (5.1%)	2 (2.4%)		
Latino/a/x or Spanish Origin	4 (2.9%)	4 (4.7%)		
White/European American	115 (84.6%)	71 (83.5%)		
More than one	4 (2.9%)	7 (8.2%)		
Child's Race/Ethnicity*				16.83*
American Indian, Alaska Native, or Indigenous	4 (2.9%)	0 (0.0%)		
Asian or Asian American	2 (1.5%)	0 (0.0%)		
Black or African American	7 (5.1%)	1 (1.2%)		
Latino/a/x or Spanish Origin	3 (2.2%)	3 (3.5%)		
Native Hawaiian or Other Pacific Islander	1 (0.7%)	0 (0.0%)		
White/European American	113 (83.1%)	66 (77.6%)		
More than one	6 (4.4%)	15 (17.6%)		
Education Level*				27.16*
GED	0 (0.0%)	2 (2.4%)		
High School Diploma	7 (5.1%)	5 (5.9%)		
Some College	17 (12.5%)	21 (24.7%)		
Bachelor's Degree	95 (69.9%)	34 (40.0%)		
Some Graduate School	7 (5.1%)	3 (3.5%)		
Graduate or Professional Degree	10 (7.4%)	18 (21.2%)		
Other	0 (0.0%)	2 (2.4%)		
Marital Status*				23.30*
Married to child's other parent	94 (69.1%)	67 (78.8%)		
Married, but not to child's other parent	20 (14.7%)	1 (1.2%)		
Cohabiting, not married	6 (4.4%)	10 (11.8%)		
Divorced	1 (0.7%)	3 (3.5%)		
Separated	10 (7.4%)	0 (0.0%)		
Single (never married)	5 (3.7%)	4 (4.7%)		

Income*			26.89*
Less than $25,000	3 (2.2%)	3 (3.5%)	
$25,00-$49,999	40 (29.4%)	9 (10.6%)	
$50,000-$74,999	43 (31.6%)	19 (22.4%)	
$75000-99,999	25 (18.4%)	20 (23.5%)	
$100,000-$124,999	14 (10.3%)	11 (12.9%)	
$125,000-$149,999	4 (2.4%)	9 (10.6%)	
$150,000-$174,999	5 (3.7%)	4 (4.7%)	
$175,000-$199,999	1 (0.7%)	4 (4.7%)	
$200,000 or more	1 (0.7%)	6 (7.1%)	
Model Variables			
Feeding for Emotion Regulation*	2.56 (1.04)	1.75 (0.57)	6.61*
Use of Food as a Reward*	3.13 (1.14)	2.58 (1.12)	3.46*
Emotional Feeding*	2.79 (1.14)	1.64 (0.63)	8.48*
Instrumental Feeding*	2.77 (1.19)	1.77 (0.65)	7.11*
Child Emotion Regulation*	3.09 (0.49)	3.44 (0.38)	-5.54*
Child Lability/Negativity*	2.04 (0.57)	1.86 (0.42)	2.40*
Child Emotional Overeating*	2.40 (1.06)	1.53 (0.66)	6.79*

[a] Child age calculated from Prolific data is an estimate based on reported birth year and month.

* Significant difference between the MTurk sample and the Prolific sample.

Measures

Coercive Control Feeding Practices

Parent feeding practices characterized by coercive control, specifically the use of food to control emotions and behaviors, were measured through parent report questionnaires. Parent report is an effective way to assess feeding, as parents are present for multiples mealtimes, and parent report measures have been found to correlate to direct observation (Piazza-Waggoner et al., 2008; Whelan & Cooper, 2000). The questionnaires in this study were the Parent Feeding Style Questionnaire (PFSQ, Wardle et al., 2002) and the Comprehensive Feeding Style Questionnaire (CFPQ; Musher-Eizenman & Holub, 1997). These questionnaires measure the specific feeding practices used by parents, rather than the parenting styles, as I was interested in the techniques used to influence child's food intake in response to emotions (Vaughn et al.,

2013). Specifically, I focused on the subscales of these questionnaires that measure coercive control related to controlling emotions and related behaviors.

Comprehensive Feeding Practices Questionnaire. Parent feeding practices were measured using two subscales from the Comprehensive Feeding Practices Questionnaire (CFPQ; Musher-Eizenman & Holub, 1997): Feeding for Emotion Regulation (α = 0.74-0.78) and Use of Food as a Reward (α = 0.66-0.69). The Feeding for Emotion Regulation subscale consists of 3 questions measuring the use of food to regulate their child's emotional states (e.g., "When this child gets fussy, is giving him/her something to eat or drink the first thing you do?"). The Use of Food as a Reward subscale is 3 questions assessing parents use of food to reward child behavior (e.g., "I offer sweets to my child as a reward for good behavior."). The scale is comprised of two types of questions. The first indicates how much parents agree or disagree with a practice on a 5-point Likert scale from 1 (*disagree*) to 5 (*agree*). The second type of question assesses how often parents engage in each practice on a 5-point Likert-type scale from 1 (*never*) to 5 (*always*). Each subscale is scored by calculating the average of all the items within that subscale. The scale has been validated in multiple populations and it has been used for children 1.5 to 8 years old (Arlinghaus et al., 2019; Vaughn et al., 2013; Gross et al., 2013). Reliability for the current study was .83 for the Feeding for Emotion Regulation subscale and .80 for the Use of Food as a Reward subscale.

Parent Feeding Style Questionnaire. Two subscales from the Parent Feeding Style questionnaire (PFSQ, Wardle et al., 2002) were used in this study: Emotional Feeding (e.g., "I give my child something to eat to make him feel better when he is upset") and Instrumental Feeding (e.g., "I reward my child with something to eat when she is well-behaved"). Parents rated their frequency of each practice on a 5-point Likert scale from 1 (*I never do*) to 5 (*I always*

do). Scores for each subscale are obtained by collecting the mean, with higher averages indicating higher use of the given parenting practice. The PFSQ has shown good test-retest reliability (r=0.76-0.83; p<0.001) and internal validity for each subscale ($\alpha_{\text{Emotional Feeding}}$=.65, $\alpha_{\text{Instrumental Feeding}}$=.85; French et al., 2012). This scale has been used in a variety of populations, including low and high SES communities and among families with varying maternal education levels (Webber et al., 2009). The PFSQ also covers a wide range of ages, from 4 to 11 years (Clark et al., 2008). Cronbach alpha for the current study was .93 for the Emotional Feeding subscale and .92 for the Instrumental Feeding subscale.

Emotion Regulation

Child emotion regulation was measured through parent report questionnaires. Because parents spend the most time with children and can observe and monitor their child's emotional behavior, parent report measures can give adequate insight to child emotion regulation. The scale used in this study was the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997). This questionnaire measures emotion regulation in preschool children. The focus of this study is on child emotion regulation strategies, such as flexibility and lability.

Emotion Regulation Checklist. Emotion regulation was measured using the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997). It is composed of 24 items split into two subscales: 15 items in the Lability/Negativity subscale (e.g., "Is easily frustrated") and 8 items in the Emotion Regulation subscale (e.g., "Can modulate excitement"), with one question not loading on either subscale. It is scored using a 4-point Likert-type scale from 1 (*never*) to 4 (*almost always*). Appropriate questions are reverse scored and averaged to create a composite score for each subscale. Higher scores on the Emotion Regulation subscale indicate higher emotion regulation abilities and higher scores on the Lability/Negativity subscale higher emotion

dysregulation. Internal consistency is high, with Cronbach alpha in the Lability/Negativity and Emotion Regulation subscales at 0.83 and 0.93, respectively (Shields & Cicchetti, 1997; Shields et al., 2001). The scale has been tested in children ages 3 to 11 years old (Crespo et al., 2017; Shields & Cicchetti, 1997). It has demonstrated good test-retest reliability (İman et al., 2017) and been used in a variety of populations (İman et al., 2017; Seguin-Lemire et al., 2017). The reliability of these subscales in the current study was .73 for the Emotion Regulation subscale and .87 for the Lability/Negativity subscale.

Emotional Overeating

Child emotional overeating was also measured using parent report measures. As with parent feeding and emotion regulation, parent report is appropriate for measuring child emotional eating, as parents are the primary people involved in child eating and mealtimes. The questionnaire used for the current study was the Child Eating Behavior Questionnaire (CEBQ; Wardle et al., 2001). This scale measures various eating behaviors, including emotional overeating and emotional undereating, which was the focus of the current study.

Child Eating Behavior Questionnaire. The emotional overeating and emotional undereating subscales of the Child Eating Behavior Questionnaire will be used to measure children's eating behavior (CEBQ; Wardle et al., 2001). The emotional overeating subscale contains four items related to overeating in response to emotions (e.g., "my child eats more when worried"). The emotional undereating subscale contains four items (e.g., "my child eats less when angry"). Parents respond using a 5-point Likert-type scale from 1 (*never*) to 5 (*always*). Higher scores indicate higher levels of that eating habit. The CEBQ has been validated with subscales demonstrating good internal consistency (α = 0.68-0.78; Sparks & Radnitz, 2012) and test-retest reliability (Wardle et al., 2001). This scale has been used for children ages 2 to 9

(Wardle, et al., 2001; Carnell & Wardle, 2007). It has been used in many countries, including the United States (Sparks & Radnitz, 2012), China (Cao et al, 2012), Chile (Santos et al, 2011), Malaysia (Loh et al, 2013) and Sweden (Svensson et al., 2011). The current study showed good reliability for each subscale ($\alpha_{overeating}$ = .89, $\alpha_{undereating}$ = .75).

Procedure

Mothers completed online surveys through Qualtrics. The survey took about 30 minutes to complete, and participants were compensated $5.00 through MTurk and $7.50 through Prolific upon completion. The survey's included attention checks and a Captcha to help ensure real participants that were paying attention into the data. Before starting the survey, participants gave informed consent for participation.

Study 2: fNIRS Pilot Study

The second study was a pilot study designed to examine the role of the dlPFC in emotion regulation in children. This study aimed to assess the feasibility and signal quality of running an fNIRS task with 4- and 5-year-old children. Specifically, I was interested in if the children completed the fNIRS task, the child's performance on each condition of the emotion regulation task, and the signal quality of the fNIRS channels. This will provide preliminary data for a future study to test our specific hypotheses regarding parent feeding, emotion regulation, and emotional feeding relating to dlPFC activation.

Participants

Mother-child dyads were recruited from the University of North Florida preschool, as well as community and school Facebook groups. Participants included 4 and 5-year-old children. Exclusion criteria for mothers and children were the same as in study 1. Based on previous fNIRS studies with preschool children analyzing PFC and emotion regulation (Perlman et al.,

2015), the aim is to recruit 25 mother child-dyads. At the time of the defense (April 21, 2023) I had 5 participants, and at the time of the final paper (May 12, 2023), I had 6 participants. Demographic data and comparisons between study 1 and study 2 are presented in Table 2.

Table 2

Sample Characteristics of Study 1 and Study 2 Samples

***n*(%) or Mean (*SD*)**	**Study 1: Online Questionnaire (*n*=221)**	**Study 2: fNIRS (*n*=6)**
Sample Characteristics		
Mother's Age (years)	34.57 (5.73)	37.83 (4.12)
Child's Age (years)[a]	5.22 (0.50)	4.78 (0.51)
Child's biological sex		
Male	98 (44.3%)	2 (33.3%)
Female	123 (55.7%)	4 (66.7%)
Mother's Race/Ethnicity		
American Indian, Alaska Native, or Indigenous	5 (2.3%)	0 (0.0%)
Asian or Asian American	2 (0.9%)	0 (0.0%)
Black or African American	9 (4.1%)	0 (0.0%)
Latino/a/x or Spanish Origin	8 (3.6%)	0 (0.0%)
White/European American	186 (84.2%)	6 (100%)
More than one	11 (5.0%)	0 (0.0%)
Child's Race/Ethnicity		
American Indian, Alaska Native, or Indigenous	4 (1.8%)	0 (0.0%)
Asian or Asian American	2 (0.9%)	0 (0.0%)
Black or African American	8 (3.6%)	0 (0.0%)
Latino/a/x or Spanish Origin	6 (2.7%)	0 (0.0%)
Native Hawaiian or Other Pacific Islander	1 (0.5%)	0 (0.0%)
White/European American	179 (81.0%)	6 (100%)
More than one	21 (9.5%)	0 (0.0%)
Education Level		
GED	2 (0.9%)	0 (0.0%)
High School Diploma	12 (5.4%)	1 (16.7%)
Some College	38 (17.2%)	0 (0.0%)
Bachelor's Degree	129 (58.4%)	0 (0.0%)
Some Graduate School	10 (4.5%)	1 (16.7%)
Graduate or Professional Degree	28 (12.7%)	4 (66.7%)

Other	2 (0.9%)	0 (0.0%)
Marital Status		
Married to child's other parent	161 (72.9%)	5 (83.3%)
Married, but not to child's other parent	21 (9.5%)	0 (0.0%)
Cohabiting, not married	16 (7.2%)	1 (16.7%)
Divorced	4 (1.8%)	0 (0.0%)
Separated	10 (4.5%)	0 (0.0%)
Single (never married)	9 (4.1%)	0 (0.0%)
Income		
Less than $25,000	6 (2.7%)	0 (0.0%)
$25,00-$49,999	49 (22.2%)	0 (0.0%)
$50,000-$74,999	62 (28.1%)	2 (33.3%)
$75000-99,999	45 (20.4%)	0 (0.0%)
$100,000-$124,999	25 (11.3%)	1 (16.7%)
$125,000-$149,999	13 (5.9%)	1 (16.7%)
$150,000-$174,999	9 (4.1%)	1 (16.7%)
$175,000-$199,999	5 (2.3%)	0 (0.0%)
$200,000 or more	7 (3.2%)	1 (16.7%)
Model Variables		
Feeding for Emotion Regulation	2.25 (0.97)	1.89 (0.34)
Use of Food as a Reward	2.92 (1.16)	3.06 (1.20)
Emotional Feeding	2.35 (1.13)	1.77 (0.56)
Instrumental Feeding	2.39 (1.13)	1.90 (0.41)
Child Emotion Regulation	3.22 (0.48)	1.93 (0.22)
Child Lability/Negativity	1.97 (0.53)	3.50 (0.29)
Child Emotional Overeating	2.07 (1.02)	1.96 (0.66)

[a] Child age calculated from Prolific data is an estimate based on reported birth year and month.

Measures

Coercive Control Feeding Practices, Emotion Regulation, and Emotional Overeating

Mothers completed the same questionnaires for parent feeding practices, emotion regulation, and emotional overeating as those in study 1. Questionnaires used for parent feeding were the Parent Feeding Style Questionnaire (PFSQ, Wardle et al., 2002; $\alpha_{\text{Emotional Feeding}}$=.87, $\alpha_{\text{Instrumental Feeding}}$= .48) and the Comprehensive Feeding Style Questionnaire (CFPQ; Musher-Eizenman & Holub, 2007; $\alpha_{\text{Emotion Regulation}}$= .65, $\alpha_{\text{Use of Food as a Reward}}$= .80). Questionnaires used to measure emotion regulation was the Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997; $\alpha_{\text{Emotion Regulation}}$=.38, $\alpha_{\text{Lability/Negativity}}$=.61). The questionnaires used to test emotional

overeating was the Child Eating Behavior Questionnaire (CEBQ; Wardle et al., 2001; $\alpha_{\text{Emotional Overeating}}$=.89, $\alpha_{\text{Emotional Undereating}}$=.73).

Materials

Stimuli

The stimuli used for the fNIRS Emotional Faces Task was photographs of faces displaying either a happy or sad expression. Photos were selected from the Developmental Emotional Faces Stimulus Set (Meuwissen, Anderson, & Zelazo, 2016). The people in the photographs ranged from 8 years old to 30 years old and contained a variety of races/ethnicities. Images in this set are age-appropriate, and the emotions portrayed in the images were clear and have been identified correctly by an average of 86%. All images are standardized in size, eye placement, and positioning and have been validated by both children and adults (Meuwissen, Anderson, & Zelazo, 2016).

Procedure

Emotional Faces Task

The task consisted of two conditions, each of which the children were asked to look at a series of photographs displaying a happy or sad face and to make a facial expression. In the Congruent condition, the children were asked to make the same facial expression as the person in the picture, and in the Incongruent condition, the children were asked to make the opposite facial expression as the person in the picture. Stimuli were presented using a block design. Each block included only Congruent trials or Incongruent trials. Conditions were presented in alternating orders and counterbalanced between participants. There were 12 blocks total, with six trials in each block. Each block consisted of three trials with happy faces and three trials with sad faces, presented in random order.

Before the start of each block, researchers read the instructions to the children for either the Congruent condition (make the same facial expression) or the Incongruent condition (make the opposite facial expression). The children were also instructed to only make facial expressions and to move the rest of their body as little as possible during the trials. Children were reminded of this between blocks as needed. Stimuli were presented using Inquisit software on a 27-inch screen for 5000 ms. Between trials, a yellow fixation star was presented for 2000 ms on the center of the screen. At the end of each block, children were awarded a small sticker and a corresponding image was presented on the screen to represent the completion of a block. This was an image of fish, increasing in number corresponding to the number of completed blocks. This was presented on the screen for a variable amount of time to allow for time to return to baseline between blocks.

Parent-child dyads completed an hour-long session in the fNIRS lab at the University of North Florida. Once participants arrived, informed consent was obtained, and the children's head circumference was measured. Parents completed the questionnaires while their child performed the fNIRS portion of the study. We began with task-training to ensure children understood the instructions for the Emotional Faces Task. Children practice the Emotional Faces Task with researchers before moving to the fNIRS room. Children first practiced the Congruent condition, where they were shown either a happy or sad face and asked to make the same facial expression. Once they made the appropriate facial expression in response to both a happy face and a sad face, we practiced the Incongruent condition, where new photographs were presented, and children were asked to make the opposite facial expression. This was also done for both a happy and a sad face. Once researchers were confident that the children understood the instructions for both the Congruent and Incongruent conditions, and the children could make the same or

opposite facial expression to both happy and sad stimuli, we moved to the fNIRS lab. Once in the testing room, a research assistant applied the fNIRS cap, checked the signal quality, and repeated the instructions for the task. Two more task-training trials were run with stimuli presented on the computer before starting the official task. A researcher remained in the room with them throughout the study to ensure proper understanding of the tasks and coded the facial expression made by the child as correct or incorrect for each trial. Each block was 40 seconds long, with variable break time in between each block. The task took approximately 15 minutes to complete.

fNIRS Data Acquisition

For the current study, the NIRScout System (NIRx Medical Technologies, LLC, Los Angeles, CA) was used. The optic cables connected to the head caps were placed on a 10-20 coordinate system at FpZ. This system has been used in other studies analyzing the dlPFC in children (Perlman et al., 2014) and was a montage used previously in the fNIRS lab at UNF. The caps contained 38 channels and 35 optodes, with 16 emitters (light sources) and 12 detector probes on the caps, with an inter-optode distance of 3 cm (Figure 1). Emitters were placed in Fpz, AF (3, 4, 7, 8), F (3,4,7,8), FT (9, 10), and FC (1,2,5,6) positions, and detectors were placed in Fp (1,2) F (1,2,5,6,9), FT (7, 8), and FC (3, 4) positions so that the probes cover area 46 of the dlPFC on each hemisphere. Additionally, 8 source channels were equipped with short channels. The caps measure absorption of near-infrared light (760 and 850 nm) at a sampling rate of 3.91 Hz.

Signal quality can be defined as a calculation of the signal amplification or gain and represents the optimal amount of light reaching the detector. The gain is measured in levels from 0-7, and the gain is optimal if the channels raw signal falls between 0.4 V and 4.0 V. During

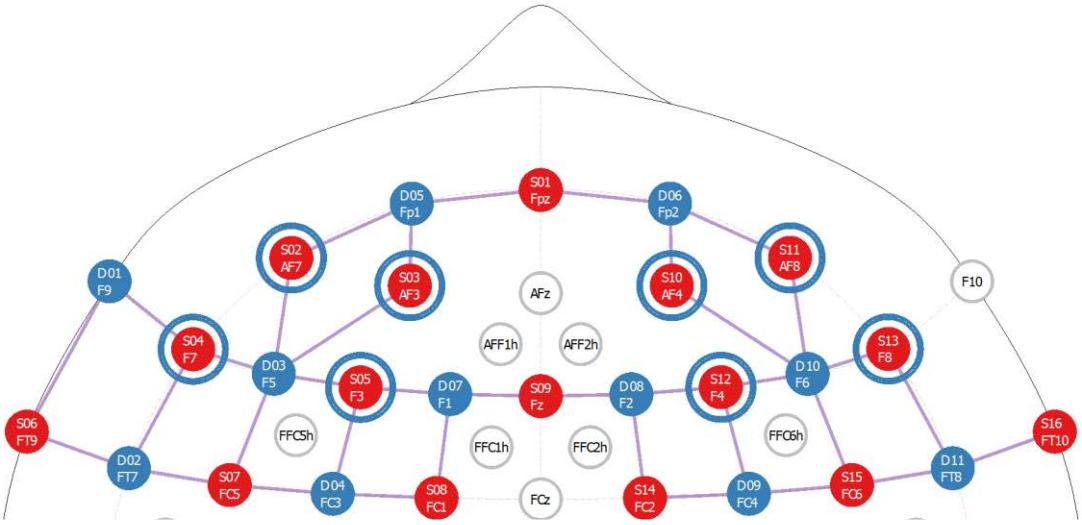
calibration, the system automatically adjusts each individual detector's light sensitivity to reach optimal gain. The NIRScout system will check first for the gain of a channel, then the signal strength of each wavelength (760 and 859 nm), and then estimates the noise level. From these measurements, a signal quality classification is obtained. There are four levels of signal quality for each individual indicator we can obtain after calibration: excellent, acceptable, critical, and lost. An excellent signal reading, indicated by a green light, means that there is clean visibility in HbO changes, and has a gain between 1-6 (0.09-1.40 V) and has a noise percentage of less than 2.5%. An acceptable reading, represented by a yellow light, means that there may be some signal that cannot be picked up by the detector, and has a gain of 7 (0.03-0.09 V; 1.40-2.50 V) and has a noise percentage between 2.5 and 7.5%. Critical signal quality, represented by red, is low and may lose much of the signal to noise. It has a gain of 0 or 8 (0.01-0.03V; >2.50 V) and has a noise percentage greater than 7.5%. Lastly, a lost signal means that the signal is severely compromised and there can be no information gained from this channel (NIRx Medical Technologies, LLC, Los Angeles, CA).

fNIRS is a form of near-infrared light measurement, equipped with a light source that emits LED lights onto an individual's head, and photodetectors placed 2-7 cm away that measure the light that has been reflected off the brain tissue. When certain brain regions engage in activity, changes in the ratio of oxygenated and deoxygenated hemoglobin result due to increased cerebral blood flow to that area (Toronov et al., 2001). Oxygenated and deoxygenated hemoglobin reflect specific light wavelengths that can be detected by near infrared spectroscopy (Jobsis, 1977). fNIRS provides more ecological validity, and higher temporal resolution than fMRI (Val-Laillet et al., 2015), and is an easy process to use on children. Validation of fNIRS has indicated high temporal and amplitude correlations with fMRI across many different tasks

and areas of the brain (Toronov et al., 2001; Strangman et al., 2002; Huppert et al., 2006; Schroeter et al., 2006; Obrig et al., 2000). fNIRS has been used in a variety of populations, including young children (Huang et al., 2019; Rosch et al., 2021; Perlman et al., 2014).

Figure 1

fNIRS Montage



Ethics

This study aimed to minimize risk and maintain confidentiality and privacy of both mothers and children as outlined in the APA Ethical Principles of Psychologists and Code of Conduct (American Psychological Association, 2019). This includes maintaining confidentiality and obtaining informed consent. The study also employed basic ethical principles of the Belmont report, including respect for persons, engaging in minimal risks, and equal treatment of all participants. The study was approved by the University of North Florida Institutional Review Board. Additionally, this task has been established at the UNF fNIRS lab for adults, and the current study adapted it by using images appropriate for this age range. Lastly, this study used

fNIRS, which is a non-invasive and safe method of measuring brain activity, and it has been FDA approved for clinical use (Irani et al., 2007).

Data Analysis Plan

Study 1: Online Parent Report Questionnaire Study

Questionnaire data were analyzed using SPSS 27 (IBM Corp, 2020). Correlations were run between the variables for coercive control, emotion regulation, and emotional overeating. The variables of coercive control include Emotional Feeding, Instrumental Feeding, Feeding for Emotion Regulation, and Use of Food as a Reward. The variables for emotion regulation include Emotion Regulation and Lability/Negativity. Assumptions were checked and met for both correlational analyses and for regression analyses. Assumptions included linear relationship between parenting practices and emotional overeating, normality and homoscedasticity of emotional overeating, and independence of variables.

Hypothesis 1: Correlations Between Parent Feeding, Emotional Overeating, and Emotional Undereating

For hypothesis 1, I predicted that coercive control parent feeding practices would be related to child emotional overeating. To test this relation, correlations were run. Variables included Feeding for Emotion Regulation, Use of Food as a Reward, Emotional Feeding, Instrumental Feeding, Emotional Overeating.

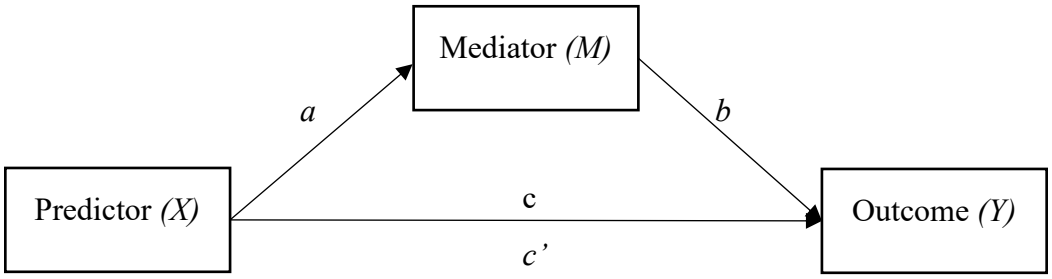
Hypothesis 2: Mediation Analyses of Parent Feeding Predicting Child Emotional Overeating, Through Child Emotion Regulation

For hypothesis 2, I aimed to investigate the mediating role of child emotion regulation (mediator variable *'M'*) in the relation between parent feeding practices (antecedent variable *'X'*) and child emotional overeating (outcome variable *'Y'*). To test this, I used a simple mediation

model, which computes the effect of *X* on *M* (*a* pathway), the effect of *M* on *Y* (*b* pathway), the total effect of *X* on *Y* (*c* or total effect), and the effect of *X* on *Y* controlling for *M* (*c'* or direct effect). A general simple mediation model is presented in Figure 2. To determine if mediation has occurred, there is also an 'indirect effect', which is the total effect minus the direct effect. When the 95% confidence interval does not include zero, we can conclude that *M* is a mediator, and that *X* predicts *Y* through *M*. Additionally, if the *c'* pathway is not significant, we can interpret this to mean the *X* does not predict *Y* when controlling for *M*. In this case, *M* is a full mediator of the relationship between *X* and *Y*. Conversely, if the *c'* pathway is significant but lesser in magnitude than the c pathway, and the indirect effect is significant, we can interpret this to mean the *X* does still predict *Y* when controlling for *M*, and *M* is a partial mediator of this relationship. Two models were tested using PROCESS software Model 4 (Hayes, 2018). Model 1 tests the four parent feeding practices (Feeding for Emotion Regulation, Use of Food as a Reward, Emotional Feeding, and Instrumental Feeding; *X*) to independently predict child emotional overeating (*Y*), with Child Emotion Regulation (*M*) as the mediator. Model 2 tests the four parent feeding practices (*X*) to independently predict child emotional overeating (*Y*), with child Lability/Negativity (*M*) as the mediator.

Figure 2

Basic Mediation Model Example



Study 2: fNIRS Pilot Study

For study 2, fNIRS feasibility data were recorded to examine child completion of the Emotional Faces Task, the child's performance on both Congruent and Incongruent trials, and the signal quality of the fNIRS channels. For each trial, researchers marked whether the children made the correct facial expression (i.e., smile when shown a sad face in Incongruent condition) or the incorrect facial expression (i.e., frown when shown a sad face in the Incongruent condition), and if the children completed the entire task.

Additionally, when fNIRS caps were placed on the childrens' heads, a calibration of the channels was run to check the signal quality. Researchers marked the percentage of excellent, acceptable, and critical level signal quality. This data was then entered into SPSS 27 and analyses were run using this database. This initial data collection will help inform data quality for further studies using this task design and imaging method. While this is exploratory, I do expect that children will be able to complete the full fNIRS emotion regulation task. I also expect that the children will make the correct facial expression for most trials of the task. I also expect that our channel quality will be adequate for collecting clean data. Both precautions are important for ensuring clean and measurable data for future studies.

Results

Study 1: Online Parent Report Questionnaire Study

Hypothesis 1: Correlations Between Parent Feeding, Emotional Overeating, and Emotional Undereating

The first hypothesis was that parent feeding practices characterized by coercive control would be related to child emotional overeating. Bivariate Pearson's correlations were ran using the Emotional Regulation subscale and the Use of Food as a Reward Subscale of the CFPQ, the

Emotional Feeding subscale and the Instrumental Feeding subscale of the PFSQ, and the Emotional Overeating subscale and Emotional Undereating subscale of the CEBQ. All four parent feeding variables were positively correlated with child emotional overeating and emotional undereating. As parents utilize more feeding practices characterized by coercive control, child emotional overeating, as well as child emotional undereating, increases (Table 3).

Table 3

Correlations of Parent Feeding, Child Emotion Regulation, Child Emotional Overeating and Covariates

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. Feeding for Emotion Regulation	*.83*	.57**	.81**	.76**	-.54**	.65**	.69**	.43**	.19**	-.11	.18*
2. Use of Food as a Reward	-	*.80*	.67**	.72**	-.42**	.42**	.41**	.43**	.10	-.11	.08
3. Emotional Feeding	-	-	*.93*	.88**	-.58**	.61**	.73**	.47**	.24**	-.13*	.17**
4. Instrumental Feeding	-	-	-	*.92*	-.61**	.62**	.67**	.50**	.22**	-.16	.15*
5. Child Emotion Regulation	-	-	-	-	*.73*	-.62**	-.54**	-.25**	-.13*	.22**	-.02
6. Child Lability/Negativity	-	-	-	-	-	*.87*	.70**	.46	.03	-.16*	.07
7. Child Emotional Overeating	-	-	-	-	-	-	*.89*	.53**	.21**	-.14*	.11
8. Child Emotional Undereating	-	-	-	-	-	-	-	*.75*	.07	-.05	.13
9. Child age	-	-	-	-	-	-	-	-	-	-.15*	-.05
10. Income	-	-	-	-	-	-	-	-	-	-	.33**
11. Education	-	-	-	-	-	-	-	-	-	-	-
M	2.25	2.92	2.35	2.39	3.22	1.97	2.07	2.94	5.22	-	-
SD	0.97	1.16	1.13	1.13	0.48	0.53	1.02	0.89	0.50	-	-

Hypothesis 2, Model 1: Mediation Analyses of Parent Feeding Predicting Child Emotional Overeating, Through Child Emotion Regulation

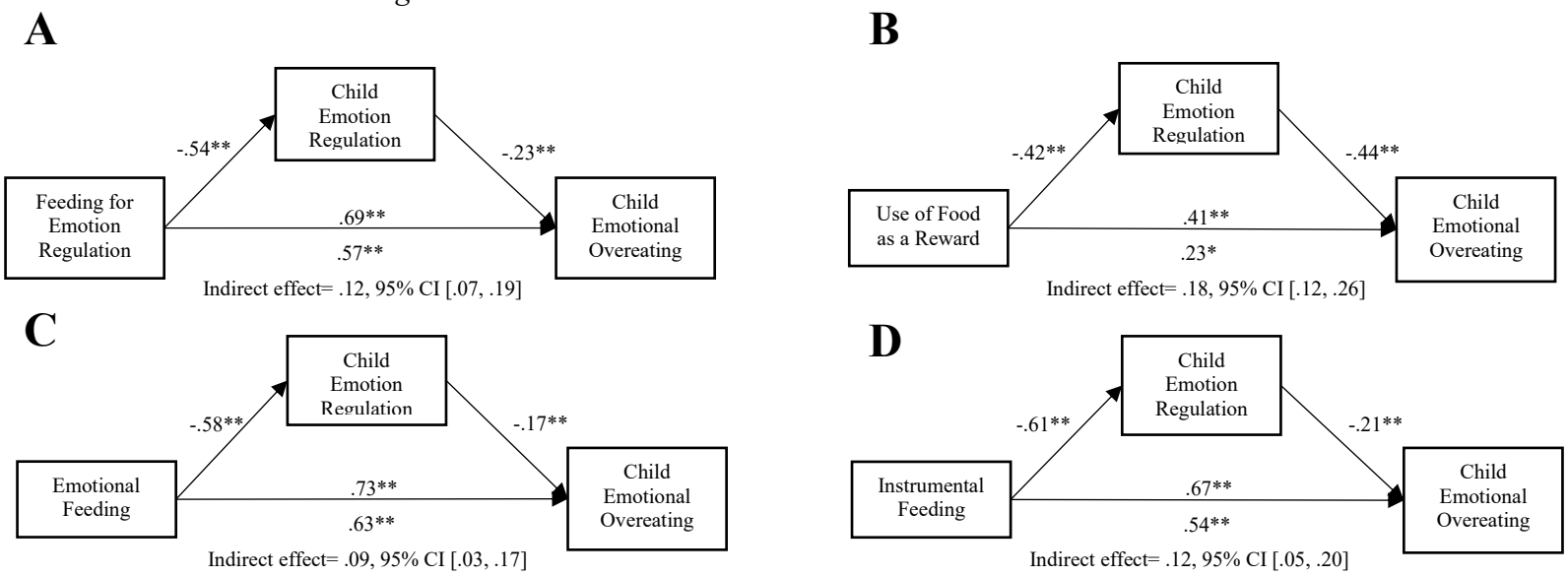
For hypothesis 2, I predicted that child emotion regulation (*M*) would mediate the relation between parent feeding (*X*) and child emotional overeating (*Y*). I also predicted a significant indirect effect of parent feeding (*X*) on child emotional overeating (*Y*) through child emotion regulation (*M*). Each parent feeding variable (Emotion Regulation, Use of Food as a Reward, Emotional Feeding, and Instrumental Feeding) were used independently as predictors and Child Emotion Regulation was used as the mediator in model 1 (Figure 3). Child age, parent age, education, and income were all tested separately as covariates, but they did not affect the overall pattern of results, therefore the results presented will be without covariates.

The results for all four parent feeding practices followed the same overall pattern. Therefore, the results of the models are presented together. The coefficients for each model are described in Figure 2. As hypothesized, parent feeding practices characterized by coercive control (Feeding for Emotion Regulation, Use of Food as a Reward, Emotional Feeding, and Instrumental Feeding) positively predicted child emotional overeating (*c*). Parent feeding practices negatively predicted Child Emotion Regulation (*a*). Child Emotion Regulation negatively predicted Child Emotional Overeating (*b*). There was a significant direct effect between parent feeding practices and Child Emotional Overeating when controlling for Child Emotion Regulation (*c'*).

Additionally, the indirect effect between parent feeding practice and Child Emotional Overeating through the mediator of Child Emotion Regulation was significant for all models. Further, the magnitude of the direct effect was smaller than the total effect. This, paired with the significant indirect effect indicates that emotion regulation was a partial mediator in this relation. This means that parent feeding styles were associated with higher Child Emotional Overeating, and this relationship is partially explained by decreased Child Emotion Regulation.

Figure 3

Model 1: Parent Feeding Practices Independently Predict Child Emotional Overeating Through Child Emotion Regulation



Hypothesis 2, Model 2: Mediation Analyses of Parent Feeding Predicting Child Emotional Overeating, Through Child Lability/Negativity

For model 2, I predicted that Child Lability/Negativity (*M*) would mediate the relation between parent feeding (*X*) and Child Emotional Overeating (*Y*). I also predicted a significant indirect effect of parent feeding (*X*) on Child Emotional Overeating (*Y*) through child Lability/Negativity (*M*). Each parent feeding variable (Emotion Regulation, Use of Food as a Reward, Emotional Feeding, and Instrumental Feeding) were used independently as predictors and Child Lability/Negativity was used as the mediator in model 2 (Figure 4). As with model 1, child age, parent age, education, and income were all tested separately as covariates, but as they did not affect the overall pattern of results, the results are presented without covariates.

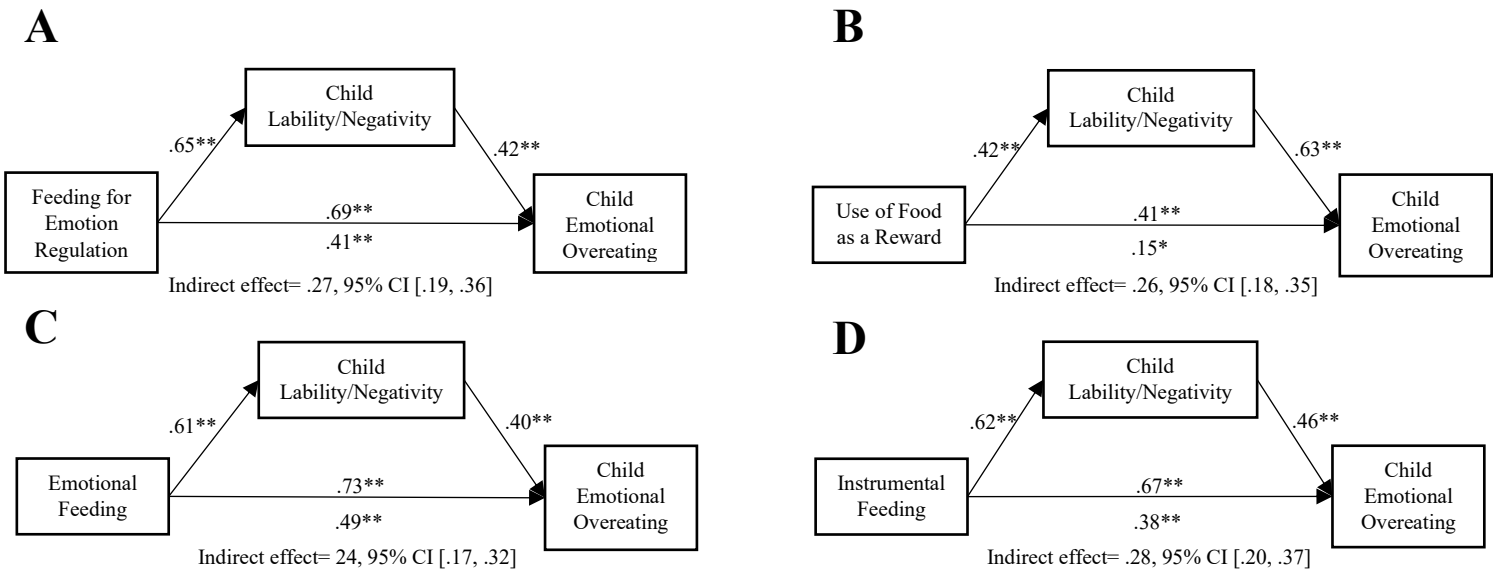
Once again, the results for all four parent feeding practices followed the same overall pattern. Therefore, the results of the models are presented together. The coefficients for each

model are described in Figure 4. As hypothesized, parent feeding practices characterized by coercive control (Feeding for Emotion Regulation, Use of Food as a Reward, Emotional Feeding, and Instrumental Feeding) positively predicted Child Emotional Overeating (*c*). Parent feeding practices positively predicted Child Lability/Negativity (*a*). Child Lability/Negativity positively predicted Child Emotional Overeating (*b*). There was a significant direct effect between parent feeding practices and Child Emotional Overeating when controlling for Child Lability/Negativity (*c'*).

Additionally, the indirect effect between parent feeding practice and Child Emotional Overeating through the mediator of Child Lability/Negativity was significant for all models. Further, the magnitude of the direct effect was smaller than the total effect. This, paired with the significant indirect effect indicates that Child Lability/Negativity was a partial mediator in this relation. This means that parent feeding styles were associated with higher Child Emotional Overeating, and this relationship is partially explained by increased Child Lability/Negativity.

Figure 4

Model 2: Parent Feeding Practices Independently Predict Child Emotional Overeating Through Child Lability/Negativity



Study 2: **fNIRS Pilot Study**

The aim of this study was to test the feasibility of the Emotional Faces Task in preschool children. Researchers collected data on children's completion of the fNIRS Emotional Faces Task, the child's performance during each condition of the task, and the signal quality of the fNIRS channels in the montage. The results of the feasibility data are shown in Table 4. All participants were able to successfully complete the training trials, and all but one was able to sit through the entire task. Regarding performance on the task, there was some variability, and the small sample size makes this data inconclusive for whether both 4-year-old and 5-year-old children can complete the task correctly. It will be important to continue this data collection in 4- and 5-year-olds, as there may be differences in performance between the age groups. However, signal quality of the fNIRS montage was excellent for all but one channel of the participants thus far.

Table 4

fNIRS Feasibility: Child Completion, Performance, and Signal Quality

Participant	Completion of Task (Number of blocks completed)		Performance on Trials (Number of trials making appropriate facial expression)		fNIRS Signal Quality (Number of channels)		
	Congruent	Incongruent	Congruent	Incongruent	Excellent	Acceptable	Critical
Participant 1	6 (100%)	6 (100%)	25 (69.4%)	32 (88.9%)	36 (100%)	0 (0%)	1 (0%)
Participant 2	0 (0%)	0 (0%)	0 (0%)	0 (0%)	36 (100%)	0 (0%)	0 (0%)
Participant 3	6 (100%)	6 (100%)	29 (80.5%)	1 (0.03%)	44 (100%)	0 (0%)	0 (0%)
Participant 4	6 (100%)	6 (100%)	1 (0.03%)	3 (0.08%)	43 (97.7%)	1 (0.02%)	0 (0%)
Participant 5	6 (100%)	6 (100%)	28 (77.8 %)	16 (44.4%)	44 (100%)	0 (0%)	0 (0%)

Discussion

Study 1: Online Parent Report Questionnaire Study

The first goal of this study was to investigate the associations and mechanisms between parent feeding practices characterized by coercive control and Child Emotional Overeating. As hypothesized, parent feeding practices (Feeding for Emotion Regulation, Use of Food as a Reward, Emotional Feeding, and Instrumental Feeding) were positively correlated to Child Emotional Overeating. Additionally, all four parent feeding practices predicted poorer Child Emotion Regulation, which led to higher Child Emotional Overeating (Model 1). Lastly, all four parenting practices predicted higher Lability/Negativity, which led to higher Child Emotional Overeating (Model 2).

This relation between parent feeding practices and child emotional overeating is consistent with previous literature (Farrow et al., 2015; Stone et al., 2022; Powel et al., 2017; Braden et al., 2014), which suggests that child emotional overeating may be subject to environmental cues and external learning. Additionally, emotion regulation has been shown to influence child emotional overeating (Powel et al., 2017; Harrist et al., 2013; Tan et al., 2015; Santos et al., 2022). The current study adds to this literature and further supports emotion regulation as a mechanism between the relation of parent feeding and child emotional overeating. That is, when feeding practices such as Emotional Feeding and Use of Food as a Reward are consistently utilized, it creates maladaptive parent child-proximal processes and may lead to a learned pattern of using food to control emotions in children that persists perhaps even into adulthood (Barnhart et al., 2021). Parent-child proximal processes created during the preschool years may contribute to these long-term eating behaviors.

The results of the current study provide further evidence in support of the theory of parental socialization, in that parent socialization of emotions can impact child emotion regulation in many facets of their life, including emotional overeating (Eisenberg et al., 1998). Parents role in socialization is to teach their children how to properly cope with their emotions, and when they use food to regulate emotions and behaviors, they are effectively not teaching other emotion regulation strategies. This can affect not only eating behaviors but could also lead to deficits in emotion regulation in other contexts. The current study implies that by using food to regulate emotions, parents are not teaching or modeling emotion regulation, however, I did not directly test parents' emotion regulation or the specific strategies they implement with their children. Future studies should measure parent's own general and context specific emotion regulation strategies, as well as the specific coaching/modeling they implement with their children to further understand this role of parent socialization in emotion regulation.

This study also provides support for the psychosomatic theory of learned emotional eating. That is, the use of non-responsive and non-nutritive feeding teaches children maladaptive mechanisms for emotion regulation, as well as maladaptive eating habits (Bruch, 1973). The findings that poorer emotion regulation and increased Lability/Negativity were mediators in the relation between parent feeding and Child Emotional Overeating indicates that children may not learn how to regulate their emotions. This may subsequently cause children to associate their emotions with hunger because of these learned associations taught through parent feeding.

Further supporting the psychosomatic theory is the shift from emotional undereating to emotional overeating. Humans' innate response to stress is to undereat, and negative emotions tend to decrease food consumption (Levine & Morley, 1981). However, as children get older, this pattern shifts to emotional overeating (Farrow et al., 2015). The psychosomatic theory

postulates that this shift is due to environmental factors, such as parent feeding that teaches children to eat in response to negative emotions. While the current study did include 4- and 5-year-old children, I did not specifically address this shift from undereating to overeating that occurs over time. However, emotional overeating was positively correlated with age, suggesting that this behavior increased as child age increased. Additionally, child age was not associated with emotional undereating, indicating that both 4- and 5-year-olds engage in this behavior. This could provide evidence for a shift from undereating to overeating that occurs as children get older, however, I cannot determine direction or causation, given the correlational and cross-sectional nature of this study. Future research should examine when this shift from the normal stress response of undereating to emotional overeating occurs, and the role of parent feeding and emotion regulation in this shift.

The four parent feeding variables measured in the current study were highly correlated, which highlights the question of whether these variables are distinct constructs, each leading to a similar outcome, or if they are measuring a single construct and should therefore be thought of as one composite parent feeding practice. There are a wide variety of parent feeding measures in the literature, with very little consensus on construct definition and conceptualization, however, in the past 10 years, there have been two methods of defining these practices.

One method of organizing parent feeding practices involved creating a review and content map of questionnaires that measure parent feeding practices (Vaughn et al., 2013). In this initial review, two distinct constructs were identified. Controlling parenting practices included use of food as a reward and non-nutritive feeding practices included both instrumental feeding and emotional feeding. In the current study, the variables for Emotional Feeding and

Instrumental Feeding were the most highly correlated of the four feeding practices, which may support this grouping between non-nutritive feeding and use of food as a reward.

However, in a more recent review, these parenting practices were all included under the construct coercive control. According to this content map, coercive control is made up of the following feeding practices: restriction, pressure to eat, using threats and bribes, and using food to control negative emotions (Vaughn et al., 2016). The variables measured in the current study would all fall under coercive control. Feeding for Emotion Regulation and Emotional Feeding would fall under using food to control negative emotions, and Use of Food as a Reward and Instrumental Feeding would fall under threats and bribes. Furthermore, in the current study, Feeding for Emotion Regulation was most highly correlated with Emotional Feeding, and Use of Food as a Reward was most highly correlated with Instrumental Feeding. Additionally, all four feeding variables followed the same pattern of results for each mediation model. It is possible that these variables are measuring the same or very similar constructs and should be combined into composite measures. Understanding and properly defining these constructs and their associated scales will be important to delineating the different types of feeding practices and which practices are the most influential in the development of child eating habits.

The relation between parent feeding and child emotion regulation is likely bidirectional, with both parents and child behavior influencing each other. Child temperament may influence parenting feeding practices. Child temperament is related to emotion regulation, and parents may utilize different feeding practices in response to their child's temperament (Haycraft et al., 2011; Rothbart et al., 1994; Steinsbekk et al., 2018). For example, children who are better at self-regulation and inhibitory control are more likely to have parents who use less restriction for health (Tan & Holub, 2011). This brings into question the direction of the relation between

parent feeding and emotion regulation. However, while child temperament can influence parenting, parents still heavily influence emotion regulation and child eating habits, as the preschool period is a time characterized by rapid emotion regulation development and is highly influenced by the environment (Garner & Power, 1996). Further, in a study of second- and third-graders, changes in emotion regulation skills predicted subsequent changes in emotional eating, indicating that emotion regulation precedes emotional overeating (Harrist et al., 2013). This study contributes to this literature and further emphasizes the complex relationship between parents and children. While the current study cannot determine the directionality between the variables, it is likely that parents and children influence each other in a reciprocal manner. Future studies should aim to investigate the potential bidirectionality of parents and children in the feeding environment, as well as the various factors that influence parenting, including child temperament.

These findings have several key implications for research and practice. First, they emphasize the role of the environment and parent socialization across contexts. Parent feeding may not only impact child feeding habits, but also child emotion regulation, which can have profound impacts in every aspect of the child's life, not just within the feeding environment (Harrington et al., 2020). While the current study examined child outcomes only within the feeding environment, the effects on child emotion regulation may extend beyond that, and future studies should look at other implications of these feeding practices. Likewise, parent feeding practices are one aspect of parent-child interactions, but they may give insight to parent practices within other contexts. It may be important to see if parents engage in different levels of responsiveness in different contexts to test if the feeding environment provides its own unique

parenting practices, or if they are an extension of their general parenting practices (Hajal & Paley, 2020).

The importance of parent feeding practices in shaping child development supports future intervention research that should target parenting practices. Interventions should work to provide support to parents so they can engage in more responsive practices (Hammersley et al., 2019). It will be important to delineate between the parent feeding constructs to determine which practices are more detrimental and which are most beneficial to support healthy eating behaviors and emotion regulation abilities in children (Gomes et al., 2021). Future research should aim to define parent feeding constructs consistently and accurately in order to inform effective parenting interventions.

There are several limitations to this study. For one, the current study utilized online self-report surveys. Online surveys are beneficial because they can easily reach a large group of people, they are cost effective, and they do not require much from the participants. However, sampling bias such as underrepresentation of individuals in certain circumstances, such as those without computer access is a problem to the external validity of the study (Nayak & Narayan, 2019). Online surveys may also present limitations to internal validity and construct validity (Ault-Brutus et al., 2012). Additionally, only surveys run the risk of attracting bots in their data. The current study carefully cross-checked various questions to avoid such participants, as well as added attention checks throughout the survey and used Captcha. However, this is still something to consider when analyzing data from online sources.

Furthermore, concerns for MTurk data quality prompted a switch to Prolific in the current study. Prolific data have been shown to yield higher quality data than MTurk (Douglas et al., 2023), and the use of both samples allowed researchers to further cross check samples for quality

data and honesty. These checks included: use of open-ended questions, Captcha, attention checks with multiple answers, and consistency among questions. Further, there may be a different demographic of participants between MTurk and Prolific, which could either increase the diversity of the sample, or create systematic differences in the data. After comparing the samples, there were significant differences in child age, child's race/ethnicity, mothers' education level, marital status, and income, however these demographic variables did not affect the results of the study. There were also significant mean differences between the MTurk sample and the Prolific sample for all variables used in the models. Additionally, there were some differences in reporting between the two samples. Prolific guidelines prevent asking for the child's exact age, so only childbirth month and year were reported, whereas in MTurk, the child's birthdate was reported. The use of online surveys, while convenient and useful for gathering large datasets, has many risks and while we did attempt to alleviate many of these risks, it is still important to recognize these concerns.

Other limitations include that this was a correlational and cross-sectional study. While directional terms are used to describe mediation models (Hayes, 2018), we cannot assume causation or direction between any of our variables. Additionally, while the sample included both four- and five-year-old children and can start shed light on the associations between emotional overeating and emotional undereating, longitudinal and experimental studies will be essential to determine this shift in eating habits and their causes.

Overall, this research is important for understanding the mechanisms behind the development of child emotional overeating, and the role of the environment in impacting children's internal regulatory systems. Parent feeding plays a large role in shaping these complex

proximal processes that influence not only children's eating behaviors, but also their emotion regulation skills, which may have a broader impact in various contexts of the child's life.

Study 2: **fNIRS Pilot Study**

The goal of this study was to check feasibility of using fNIRS to measure emotion regulation in preschool children. More data are needed to assess performance accuracy on the Emotional Faces Task in 4- and 5-year-old children. The current study included both 4- and 5-year-old children, and it may be that 4-year-olds have more difficulty in performing this task accurately. In the task, children are presented with pictures of either a happy or a sad face, and they are asked to switch between making the same facial expression or the opposite facial expression as the one presented to them. Four-year-old children have been shown to have difficulty with similar tasks that rely on the dlPFC. For instance, 4-year-olds tend to "perseverate" on a dimensional change card sort task, whereas 5- and 6-year-olds can complete this task (Doebel & Zelazo, 2015). In the current study, it is possible that the development of the dlPFC supports better performance in 5-year-olds. However, the association between performance on this task and dlPFC activity is not yet known and will be the aim of future investigations. While some studies suggest that better performance on emotion regulation tasks correlates with increased dlPFC activity (Moriguchi & Hiraki, 2011), others suggest that when performance increases, recruitment of this region is decreased (Perlman et al., 2014). Additionally, task difficulty may play a role in activation of this region. For example, if the task is too easy, children may not need to recruit the dlPFC as compared to during a task that is challenging. This would be consistent with the negative correlation that has been observed between performance and dlPFC on some tasks (Perlman et al., 2014). More data need to be

collected before sorting out these potential factors to determine whether accurate performance on the Emotional Face Task is related to increased dlPFC activity.

So far in data collection, I have recruited mostly 4 years old, however, I may see higher accuracy rates as I recruit more 5-year-olds. I plan to continue piloting both 4- and 5-year-olds and to adjust the task as needed. It will be important to determine if differences in performance are due to DLPFC development, which may influence future sample age range. Further piloting is needed to determine if both 4- and 5-year-olds can complete the task and if any potential differences in development may impact the results.

The signal quality was excellent or acceptable for all fNIRS channels in all participants run thus far. This provides initial support for obtaining clean and measurable fNIRS data in future studies involving young children. The next steps will be to analyze the associations between parent feeding, emotion regulation, emotional overeating, and the activity of the dlPFC. This is important, as we want to be measuring cortical activity related to the task, rather than child movement or other artifact. Further, preschool children may have more difficulty sitting still and attending to the task compared to adults; therefore, gathering this feasibility data is especially important in this population.

Overall, more data are required to determine whether this task is fit for both 4- and 5-year-old children. Future studies aim to continue piloting the Emotional Faces Task, as well as testing the relationships between parent feeding, emotion regulation, and emotional overeating with dlPFC activation. I expect that dlPFC activation will be positively correlated with child emotion regulation skills, and negatively correlated with coercive control feeding practices and emotional overeating. This study provides initial data for the feasibility of conducting these future studies in children, and while more piloting is needed, this is an important first step in

understanding the function and development of the dlPFC in preschool children and how its related to emotion regulation and emotional eating. This research will be important to provide parents the tools to foster both healthy eating and emotion regulation skills in young children.

References

Adriaanse, M. A., de Ridder, D. T. D., & Evers, C. (2011). Emotional eating: Eating when emotional or emotional about eating? Psychology and Health, 26(1), 23–39. https://doi.org/10.1080/08870440903207627

Ainsworth, M. S. (1979). Infant–mother attachment. American psychologist, 34(10), 932.

Aldao, A., Sheppes, G., & Gross, J. J. (2015). Emotion regulation flexibility. Cognitive Therapy and Research, 39(3), 263-278.

American Psychological Association. (2019). Publication Manual of the American Psychological Association, (2020) (p. 428). American Psychological Association.

Arnow, B., Kenardy, J., & Agras, W. S. (1995). The Emotional Eating Scale: The development of a measure to assess coping with negative affect by eating. International Journal of Eating Disorders, 18(1), 79-90.

Anzman-Frasca, S., Stifter, C. A., & Birch, L. L. (2012). Temperament and childhood obesity risk: A review of the literature. Journal of Developmental and Behavioral Pediatrics, 33(9), 732–745. https://doi.org/10.1097/DBP.0B013E31826A119F

Arlinghaus, K. R., Hernandez, D. C., Eagleton, S. G., Chen, T. A., Power, T. G., & Hughes, S. O. (2019). Exploratory factor analysis of The Comprehensive Feeding Practices Questionnaire (CFPQ) in a low-income hispanic sample of preschool aged children. Appetite, 140, 82–90. https://doi.org/10.1016/J.APPET.2019.04.029

Ault-Brutus, A. A. (2012). Changes in racial-ethnic disparities in use and adequacy of mental health care in the United States, 1990–2003. Psychiatric Services, 63(6), 531-540.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. Psychological review, 84(2), 191.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. Annual review of psychology, 52(1), 1-26.

Bandura, A., Ross, D., & Ross, S. A. (1963). Vicarious reinforcement and imitative learning. The Journal of abnormal and social psychology, 67(6), 601.

Barnhart, W. R., Braden, A. L., & Price, E. (2021). Emotion regulation difficulties interact with negative, not positive, emotional eating to strengthen relationships with disordered eating: An exploratory study. Appetite, 158, 105038.

Birch, L. L., Birch, D., Marlin, D. W., & Kramer, L. (1982). Effects of instrumental consumption on children's food preference. Appetite, 3(2), 125-134.

Birch, L. L., & Fisher, J. O. (1998). Development of eating behaviors among children and adolescents. Pediatrics, 101(Supplement_2), 539-549.

Birch, L. L., Fisher, J. O., & Davison, K. K. (2003). Learning to overeat: maternal use of restrictive feeding practices promotes girls' eating in the absence of hunger. The American journal of clinical nutrition, 78(2), 215-220.

Black, M. M., & Aboud, F. E. (2011). Responsive feeding is embedded in a theoretical framework of responsive parenting. Journal of Nutrition, 141(3), 490–494. https://doi.org/10.3945/jn.110.129973

Berthoud, H. R. (2011). Metabolic and hedonic drives in the neural control of appetite: who is the boss?. Current opinion in neurobiology, 21(6), 888-896.

Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of children's functioning at school entry. American psychologist, 57(2), 111.

Blissett, J., Haycraft, E., & Farrow, C. (2010). Inducing preschool children's emotional eating: Relations with parental feeding practices. American Journal of Clinical Nutrition, 92(2), 359–365. https://doi.org/10.3945/ajcn.2010.29375

Braden, A., Musher-Eizenman, D., Watford, T., & Emley, E. (2018). Eating when depressed, anxious, bored, or happy: are emotional eating types associated with unique psychological and physical health correlates?. Appetite, 125, 410-417.

Braden, A., Rhee, K., Peterson, C. B., Rydell, S. A., Zucker, N., & Boutelle, K. (2014). Associations between child emotional eating and general parenting style, feeding practices, and parent psychopathology. Appetite, 80, 35–40. https://doi.org/10.1016/j.appet.2014.04.017

Braet, C., & Van Strien, T. (1997). Assessment of emotional, externally induced and restrained eating behaviour in nine to twelve-year-old obese and non-obese children. Behaviour research and therapy, 35(9), 863-873.

Bronfenbrenner, U., & Morris, P. A. (2007). The bioecological model of human development. Handbook of child psychology, 1.

Bruch, H. (1973). Psychiatric aspects of obesity. Psychiatric Annals, 3(7), 6-9.

Camilleri, G. M., Méjean, C., Kesse-Guyot, E., Andreeva, V. A., Bellisle, F., Hercberg, S., & Péneau, S. (2014). The associations between emotional eating and consumption of energy-dense snack foods are modified by sex and depressive symptomatology. The Journal of nutrition, 144(8), 1264-1273.

Cao, Y. T., Svensson, V., Marcus, C., Zhang, J., Zhang, J. D., & Sobko, T. (2012). Eating behaviour patterns in Chinese children aged 12-18 months and association with relative

weight-factorial validation of the Children's Eating Behaviour Questionnaire. International Journal of Behavioral Nutrition and Physical Activity, 9(1), 1-7.

Carlson, S. M. (2005). Developmentally sensitive measures of executive function in preschool children. Developmental neuropsychology, 28(2), 595-616.

Carlson, S. M., & Wang, T. S. (2007). Inhibitory control and emotion regulation in preschool children. Cognitive Development, 22(4), 489-510.

Carnell, S., & Wardle, J. (2007). Measuring behavioural susceptibility to obesity: validation of the child eating behaviour questionnaire. Appetite, 48(1), 104-113.

Cassidy, J. (1994). Emotion regulation: Influences of attachment relationships. Monographs of the society for research in child development, 59(2-3), 228-249.

Clark, H. R., Goyder, E., Bissell, P., Blank, L., Walters, S. J., & Peters, J. (2008). A pilot survey of socio-economic differences in child-feeding behaviours among parents of primary-school children. Public health nutrition, 11(10), 1030-1036.

Combs, J. L., Pearson, C. M., & Smith, G. T. (2011). A risk model for preadolescent disordered eating. International Journal of Eating Disorders, 44(7), 596-604.

Costa, M. L., Costa, M. G. O., de Souza, M. F. C., da Silva, D. G., dos Santos Vieira, D. A., & Mendes-Netto, R. S. (2022). Cognitive restraint, emotional eating and uncontrolled eating: Exploring factors associated with the cycle of behaviors during the COVID-19 pandemic. Food Quality and Preference, 100, 104579.

Crespo, L. M., Trentacosta, C. J., Aikins, D., & Wargo-Aikins, J. (2017). Maternal emotion regulation and children’s behavior problems: The mediating role of child emotion regulation. Journal of Child and Family studies, 26(10), 2797-2809.

Dallman, M. F., Pecoraro, N., Akana, S. F., La Fleur, S. E., Gomez, F., Houshyar, H., ... & Manalo, S. (2003). Chronic stress and obesity: a new view of "comfort food". Proceedings of the National Academy of Sciences, 100(20), 11696-11701.

Denham, S. A., Caverly, S., Schmidt, M., Blair, K., DeMulder, E., Caal, S., ... & Mason, T. (2002). Preschool understanding of emotions: Contributions to classroom anger and aggression. Journal of Child Psychology and Psychiatry, 43(7), 901-916.

Doebel, S., & Zelazo, P. D. (2015). A meta-analysis of the Dimensional Change Card Sort: Implications for developmental theories and the measurement of executive function in children. Developmental Review, 38, 241-268.

Donofry, S. D., Roecklein, K. A., Wildes, J. E., Miller, M. A., & Erickson, K. I. (2016). Alterations in emotion generation and regulation neurocircuitry in depression and eating disorders: A comparative review of structural and functional neuroimaging studies. Neuroscience & Biobehavioral Reviews, 68, 911-927.

Douglas, B. D., Ewell, P. J., & Brauer, M. (2023). Data quality in online human-subjects research: Comparisons between MTurk, Prolific, CloudResearch, Qualtrics, and SONA. Plos one, 18(3), e0279720.

Eisenberg, N., Cumberland, A., & Spinrad, T. L. (1998). Parental socialization of emotion. Psychological inquiry, 9(4), 241-273.

Eisenberg, N., Cumberland, A., Spinrad, T. L., Fabes, R. A., Shepard, S. A., Reiser, M., ... & Guthrie, I. K. (2001). The relations of regulation and emotionality to children's externalizing and internalizing problem behavior. Child development, 72(4), 1112-1134.

Eisenberg, N., Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. Annual review of clinical psychology, 6, 495-525.

Engle, P. L., Bentley, M., & Pelto, G. (2000). The role of care in nutrition programmes: current research and a research agenda. Proceedings of the Nutrition Society, 59(1), 25-35.

Epel, E., Jimenez, S., Brownell, K., Stroud, L., Stoney, C., & Niaura, R. A. Y. (2004). Are stress eaters at risk for the metabolic syndrome?. Annals of the New York Academy of Sciences, 1032(1), 208-210.

Farrow, C. V., Haycraft, E., & Blissett, J. M. (2015). Teaching our children when to eat: How parental feeding practices inform the development of emotional eating-a longitudinal experimental design. American Journal of Clinical Nutrition, 101(5), 908–913. https://doi.org/10.3945/ajcn.114.103713

Francis, L. A., & Susman, E. J. (2009). Self-regulation and rapid weight gain in children from age 3 to 12 years. Archives of pediatrics & adolescent medicine, 163(4), 297-302.

French, S. A., Epstein, L. H., Jeffery, R. W., Blundell, J. E., & Wardle, J. (2012). Eating behavior dimensions. Associations with energy intake and body weight. A review. Appetite, 59(2), 541-549.

Garner, P. W., & Power, T. G. (1996). Preschoolers' emotional control in the disappointment paradigm and its relation to temperament, emotional knowledge, and family expressiveness. Child development, 67(4), 1406-1419.

Giedd, J. N., Blumenthal, J., Jeffries, N. O., Castellanos, F. X., Liu, H., Zijdenbos, A., ... & Rapoport, J. L. (1999). Brain development during childhood and adolescence: a longitudinal MRI study. Nature neuroscience, 2(10), 861-863.

Giedd, J. N. (2004). Structural magnetic resonance imaging of the adolescent brain. Annals of the new york academy of sciences, 1021(1), 77-85.

Geliebter, A., & Aversa, A. (2003). Emotional eating in overweight, normal weight, and underweight individuals. Eating behaviors, 3(4), 341-347.

Grabell, A. S., Huppert, T. J., Fishburn, F. A., Li, Y., Hlutkowsky, C. O., Jones, H. M., Wakschlag, L. S., & Perlman, S. B. (2019). Neural correlates of early deliberate emotion regulation: Young children's responses to interpersonal scaffolding. Developmental Cognitive Neuroscience, 40, 100708. https://doi.org/10.1016/J.DCN.2019.100708

Grolnick, W. S., Bridges, L. J., & Connell, J. P. (1996). Emotion regulation in two-year-olds: Strategies and emotional expression in four contexts. Child development, 67(3), 928-941.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. Review of general psychology, 2(3), 271-299.

Gross, R. S., Velazco, N. K., Briggs, R. D., & Racine, A. D. (2013). Maternal depressive symptoms and child obesity in low-income urban families. Academic Pediatrics, 13(4), 356-363.

Godet, A., Fortier, A., Bannier, E., Coquery, N., & Val-Laillet, D. (2022). Interactions between emotions and eating behaviors: Main issues, neuroimaging contributions, and innovative preventive or corrective strategies. Reviews in Endocrine and Metabolic Disorders, 1-25.

Gogtay, N., Giedd, J. N., Lusk, L., Hayashi, K. M., Greenstein, D., Vaituzis, A. C., ... & Thompson, P. M. (2004). Dynamic mapping of human cortical development during childhood through early adulthood. Proceedings of the National Academy of Sciences, 101(21), 8174-8179.

Gomes, A. I., Pereira, A. I., Roberto, M. S., Boraska, K., & Barros, L. (2021). Changing parental feeding practices through web-based interventions: a systematic review and meta-analysis. *PLoS One, 16*(4), e0250231.

Goossens, L., Braet, C., Van Vlierberghe, L., & Mels, S. (2009). Loss of control over eating in overweight youngsters: the role of anxiety, depression and emotional eating. European Eating Disorders Review: The Professional Journal of the Eating Disorders Association, 17(1), 68-78.

Hajal, N. J., & Paley, B. (2020). Parental emotion and emotion regulation: A critical target of study for research and intervention to promote child emotion socialization. *Developmental Psychology, 56*(3), 403.

Hammersley, M. L., Okely, A. D., Batterham, M. J., & Jones, R. A. (2019). Investigating the mediators and moderators of child body mass index change in the Time2bHealthy childhood obesity prevention program for parents of preschool-aged children. *Public Health, 173*, 50-57.

Harrington, E. M., Trevino, S. D., Lopez, S., & Giuliani, N. R. (2020). Emotion regulation in early childhood: Implications for socioemotional and academic components of school readiness. *Emotion, 20*(1), 48–53. https://doi.org/10.1037/emo0000667

Harrist, A. W., Hubbs-Tait, L., Topham, G. L., Shriver, L. H., & Page, M. C. (2013). Emotion regulation is related to children's emotional and external eating. Journal of Developmental and Behavioral Pediatrics, 34(8), 557–565. https://doi.org/10.1097/DBP.0B013E3182A5095F

Hawkins, R. C., & Clement, P. F. (1984). Binge eating: Measurement problems and a conceptual model. The binge purge syndrome: Diagnosis, treatment, and research, 229-251.

Haycraft, E., Farrow, C., Meyer, C., Powell, F., & Blissett, J. (2011). Relationships between temperament and eating behaviours in young children. Appetite, 56(3), 689-692.

Hayes, A. F. (2018). Introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Guilford Press.

Hollmann, M., Pleger, B., Villringer, A., & Horstmann, A. (2013). Brain imaging in the context of food perception and eating. Current Opinion in Lipidology, 24(1), 18-24.

Huang, Y., Liu, X., Krueger, R., Santander, T., Hu, X., Leach, K., & Weimer, W. (2019, May). Distilling neural representations of data structure manipulation using fMRI and fNIRS. In 2019 IEEE/ACM 41st International Conference on Software Engineering (ICSE) (pp. 396-407). IEEE.

Huppert, T. J., Hoge, R. D., Diamond, S. G., Franceschini, M. A., & Boas, D. A. (2006). A temporal comparison of BOLD, ASL, and NIRS hemodynamic responses to motor stimuli in adult humans. Neuroimage, 29(2), 368-382.

İman, E. D., Danişman, Ş., Demircan, Z. A., & Yaya, D. (2017). The effect of the Montessori education method on pre-school children's social competence–behaviour and emotion regulation skills. Early Child Development and Care.

Irani, F., Platek, S. M., Bunce, S., Ruocco, A. C., & Chute, D. (2007). Functional near infrared spectroscopy (fNIRS): an emerging neuroimaging technology with important applications for the study of brain disorders. The Clinical Neuropsychologist, 21(1), 9-37.

IBM Corp. Released 2020. IBM SPSS Statistics for Windows, Version 27.0. Armonk, NY: IBM Corp

Jobsis, F. F. (1977). Noninvasive, infrared monitoring of cerebral and myocardial oxygen sufficiency and circulatory parameters. Science, 198(4323), 1264-1267.

Johnson, S. L., & Birch, L. L. (1994). Parents' and children's adiposity and eating style. Pediatrics, 94(5), 653-661.

Johnson, A. M., Hawes, D. J., Eisenberg, N., Kohlhoff, J., & Dudeney, J. (2017). Emotion socialization and child conduct problems: A comprehensive review and meta-analysis. Clinical psychology review, 54, 65-80.

Kim, S., & Kochanska, G. (2012). Child temperament moderates effects of parent–child mutuality on self-regulation: A relationship-based path for emotionally negative infants. Child Development, 83(4), 1275–1289. https://doi.org/10.1111/J.1467-8624.2012.01778.X

Kopp, C. B. (1989). Regulation of distress and negative emotions: A developmental view. Developmental psychology, 25(3), 343.

Kröller, K., & Warschburger, P. (2008). Associations between maternal feeding style and food intake of children with a higher risk for overweight. Appetite, 51(1), 166–172. https://doi.org/10.1016/j.appet.2008.01.012

Lazarevich, I., Camacho, M. E. I., del Consuelo Velázquez-Alva, M., & Zepeda, M. Z. (2016). Relationship among obesity, depression, and emotional eating in young adults. Appetite, 107, 639-644.

Levine, A. S., & Morley, J. E. (1981). Stress-induced eating in rats. American Journal of Physiology-Regulatory, Integrative and Comparative Physiology, 241(1), R72-R76.

Li, Y., Grabell, A. S., Wakschlag, L. S., Huppert, T. J., & Perlman, S. B. (2017). The neural substrates of cognitive flexibility are related to individual differences in preschool irritability: A fNIRS investigation. Developmental Cognitive Neuroscience, 25, 138–144. https://doi.org/10.1016/J.DCN.2016.07.002

Lincoln, C. R., Russell, B. S., Donohue, E. B., & Racine, L. E. (2017). Mother-child interactions and preschoolers' emotion regulation outcomes: Nurturing autonomous emotion regulation. Journal of Child and Family Studies, 26(2), 559-573.

Loh, D. A., Moy, F. M., Zaharan, N. L., & Mohamed, Z. (2013). Eating behaviour among multi-ethnic adolescents in a middle-income country as measured by the self-reported Children's Eating Behaviour Questionnaire. PloS one, 8(12), e82885.

Maier, S. U., Makwana, A. B., & Hare, T. A. (2015). Acute stress impairs self-control in goal-directed choice by altering multiple functional connections within the brain's decision circuits. Neuron, 87(3), 621-631.

Masheb, R. M., & Grilo, C. M. (2006). Emotional overeating and its associations with eating disorder psychopathology among overweight patients with binge eating disorder. International Journal of Eating Disorders, 39(2), 141-146.

Meuwissen, A. S., Anderson, J. E., & Zelazo, P. D. (2017). The creation and validation of the developmental emotional faces stimulus set. Behavior research methods, 49, 960-966.

Michels, N., Sioen, I., Braet, C., Eiben, G., Hebestreit, A., Huybrechts, I., Vanaelst, B., Vyncke, K., & De Henauw, S. (2012). Stress, emotional eating behaviour and dietary patterns in children. Appetite, 59(3), 762–769. https://doi.org/10.1016/J.APPET.2012.08.010

Mischel, W., & Baker, N. (1975). Cognitive appraisals and transformations in delay behavior. Journal of personality and social psychology, 31(2), 254.

Moed, A., Dix, T., Anderson, E. R., & Greene, S. M. (2017). Expressing negative emotions to children: Mothers' aversion sensitivity and children's adjustment. Journal of Family Psychology, 31(2), 224.

Molavi, P., Aziziaram, S., Basharpoor, S., Atadokht, A., Nitsche, M. A., & Salehinejad, M. A. (2020). Repeated transcranial direct current stimulation of dorsolateral-prefrontal cortex improves executive functions, cognitive reappraisal emotion regulation, and control over emotional processing in borderline personality disorder: A randomized, sham-controlled, parallel-group study. Journal of Affective Disorders, 274, 93-102.

Moriguchi, Y., & Hiraki, K. (2011). Longitudinal development of prefrontal function during early childhood. Developmental Cognitive Neuroscience, 1(2), 153-162.

Moriguchi, Y., Ohnishi, T., Decety, J., Hirakata, M., Maeda, M., Matsuda, H., & Komaki, G. (2009). The human mirror neuron system in a population with deficient self-awareness: An fMRI study in alexithymia. Human Brain Mapping, 30(7), 2063–2076. https://doi.org/10.1002/HBM.20653

Musher-Eizenman, D., & Holub, S. (1997). Comprehensive Feeding Practices Questionnaire: Validation of a New Measure of Parental Feeding Practices. https://doi.org/10.1093/jpepsy/jsm037

Nayak, M. S. D. P., & Narayan, K. A. (2019). Strengths and weaknesses of online surveys. technology, 6, 7.

Nirscout fNIRS neuroimaging: NIRS device recording: FNIRS systems: NIRS devices: Nirx. NIRx Medical Technologies. (n.d.). Retrieved May 1, 2023, from https://nirx.net/nirscout

Obrig, H., Neufang, M., Wenzel, R., Kohl, M., Steinbrink, J., Einhäupl, K., & Villringer, A. (2000). Spontaneous low frequency oscillations of cerebral hemodynamics and metabolism in human adults. Neuroimage, 12(6), 623-639.

Ochsner, K. N., Ray, R. D., Cooper, J. C., Robertson, E. R., Chopra, S., Gabrieli, J. D., & Gross, J. J. (2004). For better or for worse: neural systems supporting the cognitive down-and up-regulation of negative emotion. Neuroimage, 23(2), 483-499.

O'Connor, D. B., Jones, F., Conner, M., McMillan, B., & Ferguson, E. (2008). Effects of daily hassles and eating style on eating behavior. Health Psychology, 27(1S), S20.

Patrick, H., Hennessy, E., McSpadden, K., & Oh, A. (2013). Parenting styles and practices in children's obesogenic behaviors: scientific gaps and future research directions. Childhood obesity, 9(s1), S-73.

Perlman, S. B., Luna, B., Hein, T. C., & Huppert, T. J. (2014). fNIRS evidence of prefrontal regulation of frustration in early childhood. NeuroImage, 85, 326–334. https://doi.org/10.1016/J.NEUROIMAGE.2013.04.057

Petrovich, G. D., Ross, C. A., Holland, P. C., & Gallagher, M. (2007). Medial prefrontal cortex is necessary for an appetitive contextual conditioned stimulus to promote eating in sated rats. Journal of Neuroscience, 27(24), 6436-6441.

Piazza-Waggoner, C., Driscoll, K. A., Gilman, D. K., & Powers, S. W. (2008). A comparison using parent report and direct observation of mealtime behaviors in young children with cystic fibrosis: implications for practical and empirically based behavioral assessment in routine clinical care. Children's Health Care, 37(1), 38-48.

Powell, E. M., Frankel, L. A., & Hernandez, D. C. (2017). The mediating role of child self-regulation of eating in the relationship between parental use of food as a reward and child emotional overeating. Appetite, 113, 78-83.

Power, T. G., Olivera, Y. A., Hill, R. A., Beck, A. D., Hopwood, V., Garcia, K. S., ... & Hughes, S. O. (2016). Emotion regulation strategies and childhood obesity in high risk preschoolers. Appetite, 107, 623-627.

Rodgers, R. F., Paxton, S. J., McLean, S. A., Campbell, K. J., Wertheim, E. H., Skouteris, H., & Gibbons, K. (2014). Maternal negative affect is associated with emotional feeding practices and emotional eating in young children. Appetite, 80, 242–247. https://doi.org/10.1016/j.appet.2014.05.022

Rothbart, M. K., Ziaie, H., & O'boyle, C. G. (1992). Self? regulation and emotion in infancy. New directions for child and adolescent development, 1992(55), 7-23.

Rothbart, M. K., & Ahadi, S. A. (1994). Temperament and the development of personality. Journal of abnormal psychology, 103(1), 55.

Rösch, S. A., Schmidt, R., Lührs, M., Ehlis, A. C., Hesse, S., & Hilbert, A. (2020). Evidence of fnirs-based prefrontal cortex hypoactivity in obesity and binge-eating disorder. Brain sciences, 11(1), 19.

Sala, M. N., Pons, F., & Molina, P. (2014). Emotion regulation strategies in preschool children. British Journal of Developmental Psychology, 32(4), 440-453.

Santos, J. L., Ho-Urriola, J. A., González, A., Smalley, S. V., Domínguez-Vásquez, P., Cataldo, R., ... & Hodgson, M. I. (2011). Association between eating behavior scores and obesity in Chilean children. Nutrition journal, 10(1), 1-8.

Séguin-Lemire, A., Hébert, M., Cossette, L., & Langevin, R. (2017). A longitudinal study of emotion regulation among sexually abused preschoolers. Child Abuse & Neglect, 63, 307-316.

Schmidt, L., Tusche, A., Manoharan, N., Hutcherson, C., Hare, T., & Plassmann, H. (2018). Neuroanatomy of the vmPFC and dlPFC predicts individual differences in cognitive regulation during dietary self-control across regulation strategies. Journal of Neuroscience, 38(25), 5799-5806.

Schroeter, M. L., Kupka, T., Mildner, T., Uludağ, K., & von Cramon, D. Y. (2006). Investigating the post-stimulus undershoot of the BOLD signal—a simultaneous fMRI and fNIRS study. Neuroimage, 30(2), 349-358.

Schulze, L., Schmahl, C., & Niedtfeld, I. (2016). Neural correlates of disturbed emotion processing in borderline personality disorder: a multimodal meta-analysis. Biological psychiatry, 79(2), 97-106.

Shields, A., & Cicchetti, D. (1997). Emotion regulation among school-age children: the development and validation of a new criterion Q-sort scale. Developmental psychology, 33(6), 906.

Shields, A., Dickstein, S., Seifer, R., Giusti, L., Dodge Magee, K., & Spritz, B. (2001). Emotional competence and early school adjustment: A study of preschoolers at risk. Early education and development, 12(1), 73-96.

Silverman, I. W., & Ippolito, M. F. (1995). Maternal antecedents of delay ability in young children. Journal of Applied Developmental Psychology, 16(4), 569-591.

Silvers, J. A., Insel, C., Powers, A., Franz, P., Helion, C., Martin, R., ... & Ochsner, K. N. (2017). The transition from childhood to adolescence is marked by a general decrease in amygdala reactivity and an affect-specific ventral-to-dorsal shift in medial prefrontal recruitment. Developmental cognitive neuroscience, 25, 128-137.

Sinton, M. M., & Birch, L. L. (2005). Weight status and psychosocial factors predict the emergence of dieting in preadolescent girls. International Journal of Eating Disorders, 38(4), 346-354.

Sleddens, E. F., Kremers, S. P., De Vries, N. K., & Thijs, C. (2010). Relationship between parental feeding styles and eating behaviours of Dutch children aged 6–7. Appetite, 54(1), 30-36.

Sparks, M. A., & Radnitz, C. L. (2012). Confirmatory factor analysis of the Children's Eating Behaviour Questionnaire in a low-income sample. Eating behaviors, 13(3), 267-270.

Steinsbekk, S., Barker, E. D., Llewellyn, C., Fildes, A., & Wichstrøm, L. (2018). emotional feeding and emotional eating: reciprocal processes and the influence of negative affectivity. Child Development, 89(4), 1234–1246. https://doi.org/10.1111/cdev.12756

Stone, R. A., Blissett, J., Haycraft, E., & Farrow, C. (2022). Predicting preschool children's emotional eating: The role of parents' emotional eating, feeding practices and child temperament. Maternal & Child Nutrition, 18(3), e13341.

Strangman, G., Culver, J. P., Thompson, J. H., & Boas, D. A. (2002). A quantitative comparison of simultaneous BOLD fMRI and NIRS recordings during functional brain activation. Neuroimage, 17(2), 719-731.

Svaldi, J., Naumann, E., Trentowska, M., & Schmitz, F. (2014). General and food-specific inhibitory deficits in binge eating disorder. International Journal of Eating Disorders, 47(5), 534-542.

Svensson, V., Lundborg, L., Cao, Y., Nowicka, P., Marcus, C., & Sobko, T. (2011). Obesity related eating behaviour patterns in Swedish preschool children and association with age, gender, relative weight and parental weight-factorial validation of the Children's Eating

Behaviour Questionnaire. International Journal of Behavioral Nutrition and Physical Activity, 8(1), 1-11.

Sweetman, C., McGowan, L., Croker, H., & Cooke, L. (2011). Characteristics of Family Mealtimes Affecting Children's Vegetable Consumption and Liking. Journal of the American Dietetic Association, 111(2), 269–273. https://doi.org/10.1016/J.JADA.2010.10.050

Tan, C. C., & Holub, S. C. (2011). Children's self-regulation in eating: Associations with inhibitory control and parents' feeding behavior. Journal of Pediatric Psychology, 36(3), 340–345. https://doi.org/10.1093/JPEPSY/JSQ089

Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. Monographs of the society for research in child development, 25-52.

Topham, G. L., Hubbs-Tait, L., Rutledge, J. M., Page, M. C., Kennedy, T. S., Shriver, L. H., & Harrist, A. W. (2011). Parenting styles, parental response to child emotion, and family emotional responsiveness are related to child emotional eating. Appetite, 56(2), 261–264. https://doi.org/10.1016/J.APPET.2011.01.007

Toronov, V., Webb, A., Choi, J. H., Wolf, M., Michalos, A., Gratton, E., & Hueber, D. (2001). Investigation of human brain hemodynamics by simultaneous near-infrared spectroscopy and functional magnetic resonance imaging. Medical physics, 28(4), 521-527.

Tryon, M. S., Carter, C. S., DeCant, R., & Laugero, K. D. (2013). Chronic stress exposure may affect the brain's response to high calorie food cues and predispose to obesogenic eating habits. Physiology & behavior, 120, 233-242.

Underwood, M. K., Coie, J. D., & Herbsman, C. R. (1992). Display rules for anger and aggression in school-age children. Child development, 63(2), 366-380.

Val-Laillet, D., Aarts, E., Weber, B., Ferrari, M., Quaresima, V., Stoeckel, L. E., ... & Stice, E. (2015). Neuroimaging and neuromodulation approaches to study eating behavior and prevent and treat eating disorders and obesity. NeuroImage: Clinical, 8, 1-31.

van Strien, T., & Bazelier, F. G. (2007). Perceived parental control of food intake is related to external, restrained and emotional eating in 7–12-year-old boys and girls. Appetite, 49(3), 618-625.

van Strien, T., & Oosterveld, P. (2008). The children's DEBQ for assessment of restrained, emotional, and external eating in 7-to 12-year-old children. International journal of eating disorders, 41(1), 72-81.

Van Strien, T., & Ouwens, M. A. (2007). Effects of distress, alexithymia and impulsivity on eating. Eating behaviors, 8(2), 251-257.

Vaughn, A. E., Tabak, R. G., Bryant, M. J., & Ward, D. S. (2013). Measuring parent food practices: a systematic review of existing measures and examination of instruments. International Journal of Behavioral Nutrition and Physical Activity, 10(1) 1-27 https://doi.org/10.1186/1479-5868-10-61

Vaughn, A. E., Ward, D. S., Fisher, J. O., Faith, M. S., Hughes, S. O., Kremers, S. P., ... & Power, T. G. (2016). Fundamental constructs in food parenting practices: a content map to guide future research. Nutrition reviews, 74(2), 98-117.

Wardle, J., & Carnell, S. (2007). Parental feeding practices and children's weight. Acta Paediatrica, 96, 5-11.

Wardle, J., Guthrie, C. A., Sanderson, S., & Rapoport, L. (2001). Development of the children's eating behaviour questionnaire. The Journal of Child Psychology and Psychiatry and Allied Disciplines, 42(7), 963-970.

Wardle, J., Marsland, L., Sheikh, Y., Quinn, M., Fedoroff, I., & Ogden, J. (1992). Eating style and eating behaviour in adolescents. Appetite, 18(3), 167-183.

Wardle, J., Sanderson, S., Guthrie, C. A., Rapoport, L., & Plomin, R. (2002). Parental Feeding Style and the Inter-generational Transmission of Obesity Risk. Obesity Research, 10(6), 453–462. https://doi.org/10.1038/OBY.2002.63

Webber, L., Hill, C., Saxton, J., Van Jaarsveld, C. H. M., & Wardle, J. (2009). Eating behaviour and weight in children. International journal of obesity, 33(1), 21-28.

Wilson, S. M., Darling, K. E., Fahrenkamp, A. J., D, A. L., & Sato, A. F. (2015). Predictors of emotional eating during adolescents' transition to college: Does body mass index moderate the association between stress and emotional eating? College Health, 63, 163–170. https://doi.org/10.1080/07448481.2014.1003374

Whelan, E., & Cooper, P. J. (2000). The association between childhood feeding problems and maternal eating disorder: a community study. Psychological medicine, 30(1), 69-77.

Wood, G., Ischebeck, A., Koppelstaetter, F., Gotwald, T., & Kaufmann, L. (2009). Developmental trajectories of magnitude processing and interference control: An fMRI study. Cerebral Cortex, 19(11), 2755-2765.

Wood, S. M. W., Schembre, S. M., He, Q., Engelmann, J. M., Ames, S. L., & Bechara, A. (2016). Emotional eating and routine restraint scores are associated with activity in brain regions involved in urge and self-control. Physiology and Behavior, 165, 405–412. https://doi.org/10.1016/j.physbeh.2016.08.024