

Fall 12-2014

## **Eating, Feeding, and Weight in Early Childhood: Investigation of Child Eating Behaviors and Maternal Feeding Style as Influences on Preschoolers' Body Mass Index**

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The University of Southern Mississippi

EATING, FEEDING, AND WEIGHT IN EARLY CHILDHOOD: INVESTIGATION  
OF CHILD EATING BEHAVIORS AND MATERNAL FEEDING STYLE AS  
INFLUENCES ON PRESCHOOLERS' BODY MASS INDEX

by

Maren Elizabeth Hankey

A Thesis  
Submitted to the Graduate School  
of The University of Southern Mississippi  
in Partial Fulfillment of the Requirements  
for the Degree of Master of Arts

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December 2014

## ABSTRACT

# EATING, FEEDING, AND WEIGHT IN EARLY CHILDHOOD: INVESTIGATION OF CHILD EATING BEHAVIORS AND MATERNAL FEEDING STYLE AS INFLUENCES ON PRESCHOOLERS' BODY MASS INDEX

by Maren Elizabeth Hankey

December 2014

Research investigating determinants of obesity risk during early childhood highlights the role of children's eating behaviors as well as food-related parenting practices. Compared with the vast literature on parent feeding practices, little is known regarding parent feeding styles, and the mechanisms through which child eating behaviors and parent feeding styles influence child body mass index (BMI) remain poorly understood. The current study addressed this gap in the literature by a) describing the prevalence and correlates of parent feeding styles in a sample of mothers residing in the southern United States and b) exploring associations among child eating behaviors, parent feeding styles, and child BMI. Participants included 128 mothers ( $M$  age = 32.0,  $SD$  = 5.01) with preschoolers (64 male, 64 female,  $M$  age = 3.76,  $SD$  = 0.71). Results indicated that the prevalence of each feeding style in this sample closely parallels the distribution reported in previous studies and is not related to maternal socio-demographic characteristics and mothers' or children's BMI. Higher child appetitive traits and lower satiety responsiveness were associated with higher child BMI. Children with high levels of emotional eating were more likely to have a higher BMI, but only in the presence of an uninvolved parent feeding style. An uninvolved feeding style also moderated the association between fussiness and child BMI, with higher levels of fussy child eating

behavior associated with lower child BMI. More research is needed to elucidate the interactions among child eating behaviors and parent feeding styles in the prediction of child obesity risk.

## ACKNOWLEDGMENTS

I would like to thank my major professor, Dr. Natalie Williams, for her guidance and encouragement throughout the research process. Special thanks also go to my committee members, Drs. Tammy Barry and Sara Sytsma Jordan, for their advice and support in the writing of this document.

## TABLE OF CONTENTS

ABSTRACT .....	ii
ACKNOWLEDGMENTS .....	iv
LIST OF TABLES .....	vii
LIST OF ILLUSTRATIONS .....	viii
CHAPTER	
I. INTRODUCTION .....	1
II. CHILDHOOD OBESITY OVERVIEW.....	2
Prevalence	
Health and Psychosocial Impact	
Course and Treatment	
Determinants of Weight in Early Childhood	
Child Eating Behaviors	
III. PARENTING IN THE FEEDING CONTEXT .....	11
Feeding Practices	
Feeding Styles	
IV. CHILD EATING BEHAVIORS, PARENT FEEDING STYLES, AND CHILD WEIGHT.....	16
V. THE CURRENT STUDY.....	20
Study Objectives and Specific Hypotheses	
VI. METHODS .....	23
Participants	
Measures	
Procedures	
VII. RESULTS .....	31
Preliminary Analyses	
Objective 1: Prevalence and Correlates of Mothers' Feeding Styles	
Objective 2: Feeding Style Group Differences in Child Eating Behaviors	
Objective 3: Maternal Feeding Style, Child Eating Behaviors, and Child Weight Status	

VIII. DISCUSSION OF RESULTS.....	48
Prevalence and Correlates of Maternal Feeding Style	
Associations between Feeding Style and Child Eating Behaviors	
Feeding Style, Child Eating Behaviors, and Child BMI	
Limitations and Future Directions	
APPENDIXES .....	64
REFERENCES .....	69

## LIST OF TABLES

### Table

1.	Maternal Descriptive Characteristics .....	24
2.	Child Descriptive Characteristics .....	25
3.	Descriptive Statistics and Psychometric Properties of the CEBQ Scales .....	34
4.	Feeding Style Group Differences in Mean Scores on CEBQ Scales .....	35
5.	Summary of multiple regression analyses predicting child BMIz from emotional undereating, mothers' feeding style, and the interaction between emotional undereating and feeding style .....	38
6.	Summary of multiple regression analyses predicting child BMIz from emotional overeating, mothers' feeding style, and the interaction between emotional overeating and feeding style .....	40
7.	Summary of multiple regression analyses predicting child BMIz from food responsiveness, mothers' feeding style, and the interaction between food responsiveness and feeding style .....	42
8.	Summary of multiple regression analyses predicting child BMIz from food enjoyment, mothers' feeding style, and the interaction between food enjoyment and feeding style .....	43
9.	Summary of multiple regression analyses predicting child BMIz from satiety responsiveness, mothers' feeding style, and the interaction between satiety responsiveness and feeding style .....	44
10.	Summary of multiple regression analyses predicting child BMIz from fussiness, mothers' feeding style, and the interaction between fussiness and feeding style.....	45
11.	Summary of multiple regression analyses predicting child BMIz from desire to drink, mothers' feeding style, and the interaction between desire to drink and feeding style.....	47



## LIST OF ILLUSTRATIONS

### Figure

1. Relation between emotional undereating, uninvolved feeding style, and child BMI ..... 39
2. Relation between emotional overeating, uninvolved feeding style, and child BMI ..... 41
3. Relation between fussiness, uninvolved feeding style, and child BMI ..... 46

## CHAPTER I

### INTRODUCTION

Childhood obesity is a global public health concern that is epidemic in the United States. Since 1980, rates of obesity have doubled among children and tripled among adolescents (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010). Obesity is associated with both physical and mental health morbidities (Neef et al., 2013; Reilly et al., 2011), is resistant to treatment (Whitaker et al., 1997), and, once established, typically persists from childhood into adolescence and adulthood (Reilly et al., 2003; Reilly, 2006). Early childhood is a crucial developmental period to begin preventive interventions to reduce the risk for obesity. However, there is a paucity of research investigating potential targets for such interventions.

This thesis begins with a brief overview of the epidemiology, impact, and course of childhood obesity in the United States. Literature on the etiology of obesity during early childhood is then considered, with an emphasis on child eating behaviors and parenting-related risk factors for excessive weight gain in young children. Child eating behaviors are associated with weight in early childhood, and a small but growing literature links parents' food-related parenting styles and child obesity risk. However, the mechanisms through which these two risk factors may jointly influence children's weight status are poorly understood. Such data are critically needed to build the evidence base informing the development of obesity prevention programs for young children.

## CHAPTER II

### CHILDHOOD OBESITY OVERVIEW

#### Prevalence

Although recent evidence suggests that childhood obesity rates have plateaued and even modestly declined in some cities and states (Gamble et al., 2012), the problem of overweight and obesity continues to affect millions of children in the United States. Currently, 34.7% of U. S. children ages 6 to 19 years are classified as overweight, meaning that they have a body mass index (BMI) between the 85<sup>th</sup> and 95<sup>th</sup> percentile when compared to age- and sex-specific norms (CDC, 2010), and 18.7% are classified as obese, having BMIs  $\geq$  95th percentile (Ogden, Carroll, Kit, & Flegal, 2012). Obesity is a concern that emerges early in life, evidenced by data showing that more than 20% of children ages 2 to 5 years are overweight or obese.

The problem of overweight and obesity disproportionally affects children from racial and ethnic minority groups (Ogden et al., 2010). Illustratively, 21.2% of Hispanic children and 24.3% of non-Hispanic black children ages 2 to 19 years meet criteria for obesity, compared with only 14.0% of non-Hispanic white children. American Indian and Alaska Native children currently have the highest childhood obesity burden, with 20.7% of preschoolers now considered obese (CDC, 2012). Recent trends suggest that although obesity rates have remained relatively stable, the disparity between African Americans and non-Hispanic white youth is increasing (Gamble et al., 2012).

Elevated rates of childhood obesity are also evident among members of underserved populations and are most pronounced among male children. Since 2003, American Indian and Alaska Native children are the only population that has shown a

significant increase in obesity rates (CDC, 2012). Nearly a quarter (24.3%) of non-Hispanic black males and females are obese. Obesity rates among low-income preschoolers are also significantly higher, with one in three low-income children ages 2 to 4 years now considered overweight or obese (CDC, 2012). The highest rates of obesity are found among male children from racial and ethnic minority backgrounds. For example, 23.4% of Hispanic males are obese, compared with 18.9% of Hispanic females. Although obesity rates among non-Hispanic white children ages 2 to 19 have stabilized or decreased since 2008, rates among non-Hispanic black males have continued to increase steadily (Ogden et al., 2012). Together, these data highlight the need for continued treatment and prevention efforts.

#### Health and Psychosocial Impact

Childhood obesity is linked to many adverse physical, psychological, and social outcomes. Freedman, Mei, Srinivasan, Berenson, and Dietz (2007) found that the proportion of children with two or more health risk factors increases from 5% for children with BMIs < 25<sup>th</sup> percentile to 59% for children with BMIs > 99<sup>th</sup> percentile. Children identified as overweight or obese have a higher probability of several health risk factors, including metabolic, cardiovascular, gastrointestinal, pulmonary, and orthopedic health concerns (Neef et al., 2013). Specific health complications have been found in increasing prevalence among obese children, including hyperlipidemia, glucose intolerance, and cholelithiasis (gallstones) (Dietz, 1998). Other common health risks include hypertension, sleep apnea, orthopedic complications (Dietz, 1998), Type II diabetes (Celermajer, 2009), disordered eating (Trent, Jennings, Waterfield, Lyman, & Thomas, 2009), osteoarthritis, atherosclerosis, asthma, and many others (Neef et al.,

2013). Health risks associated with obesity such as cardiovascular disease often track into adulthood, placing obese children and adolescents at an increased risk for early mortality in adulthood (Neef et al., 2013).

Beyond physical ailments, childhood obesity is linked to many psychological difficulties (Reilly & Kelly, 2011). One study showed that 58% of obese youth met criteria for at least one psychiatric disorder (Vila et al., 2004). Common psychological comorbidities include anxiety (Anderson, Cohen, Naumova, & Must, 2006; Hillman, Dorn, & Huang, 2010), depression (Merikangas, Mendola, Pastor, Reuben, & Cleary, 2012), general internalizing symptoms (Fiese, Everhart, & Wildenger, 2009), ADHD (Kim, Mutyala, Agiovlasitis, & Fernhall, 2011; Mirza, Kadow, Palmer, Solano, Rosche, et al., 2004), and behavioral problems (Datar & Sturm, 2004; Lumeng, Gannon, Cabral, Frank, & Zuckerman, 2003). These comorbidities may disproportionately affect minority populations. Illustratively, a link has been found between depression and obesity in non-Hispanic black adolescents but not in other groups (Merikangas et al., 2012). The implications of many of these psychological risks can be far-reaching and often begin in early childhood (Pulgarón, 2013). One study of kindergarteners found that overweight females had a much higher probability of teacher-reported externalizing behavior problems compared with their normal-weight peers (Datar & Sturm, 2004).

Obesity can also have a significant negative effect on children's social functioning, affecting their perception of themselves and their relationships with others. Studies looking at weight status and self-concept have found that while not all overweight children have a negative self-concept, certain groups are especially vulnerable (Dreyer & Egan, 2008). These include females (Sweeting, Wright, & Minnis,

2005), adolescents (Strauss, 2000), and minorities (Strauss, 2000). Obese children also consistently report lower health-related quality of life, a multidimensional construct that includes social functioning, than their normal weight peers (Zeller & Modi, 2006). One study found that obese children and adolescents were 5.5 times more likely to have impaired health-related quality of life, comparable rates to those of children and adolescents diagnosed with cancer (Schwimmer, Burwinkle, & Varni, 2003). Being overweight may also contribute to specific impairments in peer relationships (Young-Hyman, Tanofsky-Kraff, Yanovski, Keil, Cohen, & Peyrot, 2006), including problems such as bullying, social ostracization (Gibson, 2011), and weaker social skills (Jacobson & Mazurek Melnyk, 2011). In general, studies suggest that overweight children are often perceived by peers as being more isolated, less attractive, less athletic, and more likely to be ill and fatigued (Zeller, Reiter-Purtill, & Ramey, 2008).

#### Course and Treatment

Once established, childhood obesity tends to persist into adolescence and adulthood (Reilly et al., 2003; Reilly, 2006). Illustratively, one longitudinal study examining the relationship between childhood BMI and obesity found that whereas only 5% of children with a BMI < 50<sup>th</sup> percentile were obese adults, 84% of obese children and 100% of severely obese (BMI > 99<sup>th</sup> percentile) children remained obese into adulthood (Freedman et al., 2007). Further, research shows that the negative health consequences of obesity, such as early signs of heart disease, appear as early as age three (Skinner, Steiner, Henderson, & Perrin, 2010). Weight status during early childhood is critical, as after age six the probability of an obese child becoming an obese adult exceeds 50% (Whitaker, Wright, Pepe, Seidel, & Dietz, 1997). Further, research shows that

roughly 70% of obese adolescents will remain obese throughout their lifetimes (Freedman et al., 2005; Reilly et al., 2003; Whitaker et al., 1997). The likelihood of childhood obesity tracking into adulthood may vary by gender and ethnicity. Overweight adolescent males have a 62% probability of obesity as adults compared to a 73% probability for overweight females. Among obese adolescents, that probability increases to 80% for males and 92% for females. Non-Hispanic black females and Non-Hispanic black and Hispanic male adolescents have an increased probability of remaining obese as adults relative to non-Hispanic white males and females (Ogden et al., 2012).

One reason childhood obesity tends to track from childhood into adulthood is because of limitations in treatment effectiveness. Among weight management approaches for children and youth, behavioral family-focused interventions based on tenets of social-ecological theory have demonstrated the most success (Kitzmann & Beech, 2006; Stokols, 1996). These interventions typically seek to improve child weight status by empowering parents to modify the home environment and help motivate their children to adopt healthy eating and physical activity habits. Interventions include educational components focused on nutrition and physical activity, as well as training in parenting skills such as contingency management, stimulus control, and modeling. Although behavioral interventions have been shown to have a positive impact on weight in the short-term, evidence for the long-term benefits of these interventions is less compelling (Whitlock, O'Connor, Williams, Beil, & Lutz, 2010). For example, primary care-based behavioral interventions have been shown to moderately decrease child weight post-treatment, although these effects have not been found to continue into long-term maintenance (Whitlock et al., 2010). Only one study was found to show maintenance of

weight loss achieved during a moderately intensive behavioral intervention at a 12-month follow-up (Mellin, Slinkard, & Irwin, 1987). Additionally, low-intensity interventions reveal no benefits in terms of maintaining weight loss at long-term follow-up (Reinehr, de Sousa, Tschke, & Andler, 2006; Reinehr, Temmesfeld, Kersting, de Sousa, & Toschke, 2007; McCallum, Wake, Gerner, Harris, Gibbons, Gunn, et al., 2005; McCallum, Wake, Gerner, Bauer, Gibbons, Gold, et al., 2007). Evidence that this change in weight impacts child health outcomes, such as a decreased risk of cardiovascular issues or insulin resistance, is inconsistent (Whitlock et al., 2010). In a similar meta-analysis examining the success rates of obesity intervention studies for preschoolers specifically, published interventions were found to have minimal long-term impact on child weight status (Summerbell et al., 2005).

#### Determinants of Weight in Early Childhood

A strong familial predisposition to obesity has been widely documented, and data suggest that a child with at least one obese parent is three times more likely to be an obese adult compared to a child with no obese parents (Birch & Fisher, 2000). Research examining mechanisms accounting for this increased risk for obesity suggests that genetic, epigenetic, and environmental factors all play a role in determining an individual's weight status. However, whereas it is recognized that risk factors for childhood obesity are made up of a complex range of hereditary and environmental influences, several risk factors are especially salient in early childhood (Ebbeling, Pawlak, & Ludwig, 2002; Reilly, 2005). In very young, otherwise healthy children, the primary modifiable risk or protective factors for obesity are those that affect energy balance (i.e., energy intake and energy expenditure). During early childhood (i.e., the



developmental period between 0 and 8 years of age), children's energy balance is largely defined by their adoption of particular patterns of diet, activity, and sedentary behaviors (Birch & Fisher, 1998). At the most basic level, children's risk for excessive weight gain is increased by the consumption of large portions of energy-dense foods, excessive energy intake, and inadequate physical activity (Birch & Davison, 2001; Birch & Fisher, 1998). However, factors such as children's eating behaviors also have been found to play a role in the determination of weight.

### Child Eating Behaviors

Previous research has identified several key eating behaviors that are associated with higher weight status in children, including emotional eating, eating speed, satiety responsiveness, enjoyment of food, and food responsiveness. *Emotional overeating* refers to overeating in response to negative emotional states such as anxiety, anger, and sadness (e.g., "My child eats more when anxious"). Higher levels of emotional overeating have been linked to higher child adiposity (Ganley, 1989; Webber et al., 2009; Wardle, Guthrie, Sanderson, & Rapoport, 2001), with one study finding significantly higher levels of emotional eating in children attending a behavioral treatment program for overweight/obesity compared to community controls (Croker, Cooke, & Wardle, 2011). *Eating speed* assesses how quickly a child consumes food (e.g., "My child finishes meals quickly"), and research shows a connection between higher child weight status and faster eating speed (Barkeling, Ekman, & Rossner, 1992; Drabman, Cordua, Hammer, Jarvie, & Horton, 1979; Agras, Kraemer, Berkowitz, Korner, & Hammer, 1987). Llewellyn, Jaarsveld, Van Boniface, Carnell, and Wardle (2008) found that overweight and obese children displayed the fastest eating rate compared to normal weight and underweight

children. *Satiety responsiveness* is the degree to which a child ceases to eat or chooses not to eat based on their perceived fullness (e.g., “My child gets full before his/her meal is finished”). Studies suggest that overweight/obese children have lower levels of satiety responsiveness compared to normal weight peers (Carnell & Wardle, 2007, 2008; Fisher et al., 2007; Fisher & Birch, 2002; Moens, Braet, & Soetens, 2007; Webber et al., 2009).

Both *enjoyment of food* and *food responsiveness* address children’s general appetite and desire to eat. Enjoyment of food refers to a child’s general levels of appetite and positive reactions to food (e.g., “My child looks forward to mealtimes”). Research has found positive associations between higher enjoyment of food and both child BMI (Webber et al., 2009) and total energy intake (Carnell & Wardle, 2007). Food responsiveness also assesses child appetite for food and desire to eat, but with a greater emphasis on maladaptive eating behaviors (e.g., “Given the choice, my child would eat most of the time”). It also assesses a child’s tendency to eat in response to external cues such as the sight, smell, and taste of food. Overweight children have been shown to eat more in response to external food cues than normal weight children (Carnell, Haworth, Plomin, & Wardle, 2008; Carnell & Wardle, 2007; Jansen et al., 2003; Webber et al., 2009), with one study showing that higher food responsiveness was associated with progressively higher child adiposity (Carnell & Wardle, 2008). Obese children with higher food responsiveness have also been found to show a higher preference for fatty foods and have stronger appetitive reactions to food and drink (Wardle, Guthrie, Sanderson, Birch, & Plomin, 2001b).

Little research has investigated differences in gender or age for each of these child eating behaviors. Wardle et al. (2001a) found no gender differences across eating behaviors. For

age-related differences, both food responsiveness and enjoyment of food were found to increase with age. Satiety responsiveness and slowness in eating, conversely, were found to decrease with age. Emotional eating is more variable, with research suggesting that emotional overeating increases with age and emotional undereating decreases with age (Wardle et al., 2001a).

The home environment is paramount in its influence on the development and maintenance of children's eating behaviors as well as the underlying factors that affect these behaviors, such as children's food-related attitudes and food preferences. Although infants are highly responsive to internal appetitive signals as a means of controlling food consumption, this responsivity appears to be influenced by external factors (Birch & Fisher, 1998). Specifically, as children move from infancy into the toddler and preschool years, their eating becomes less internally controlled and increasingly determined by parental behaviors and cues. The directionality of the relationship between parenting feeding tactics and child eating behaviors is complex, and it is likely that a transactional relationship exists, such that child eating behaviors prompt parental approaches to feeding, which in turn alter child eating behaviors. In recognition of the importance of parent behaviors in weight outcomes during early childhood, a growing literature has examined both parenting feeding practices and parent feeding styles. This literature is reviewed below.

## CHAPTER III

### PARENTING IN THE FEEDING CONTEXT

#### Feeding Practices

Parents can influence children's dietary intake through their adoption of various feeding practices. Parental feeding practices are goal-directed and occur in specific contexts. Feeding practices determine when, how often, and the circumstances in which children eat, as well as influence the amount and type of food eaten. As such, feeding practices may include parent-specific behaviors such as monitoring children's food intake, restricting or controlling food intake, pressuring to eat, and instrumental and emotional feeding.

Findings on the relationship between parent feeding behaviors and childhood obesity have been somewhat inconsistent due to differences across studies in construct definition and measurement. A recent literature review by Vollmer and Mobley (2013) examined studies of both parenting style ( $N = 39$ ) and parent feeding style ( $N = 10$ ) in relation to childhood eating patterns and risk of being overweight. Findings suggest that controlling feeding practices characterized by restriction, emotional feeding, encouragement to eat, weight-based restriction, and fat restriction are associated with children's dietary intake and the development of obesity (Vollmer & Mobley, 2013). Several cross-sectional studies looking at parental control over the feeding environment have revealed that parental control is positively associated with higher child BMI, intakes of both healthy and unhealthy foods, and lower amounts of physical activity (Baughcum et al., 2001; Brown & Ogden, 2004; Gable & Lutz, 2012; Nicklas, Yang, Baranowski, Zakeri, & Berenson, 2003). Pressuring children to eat is also associated with higher child

and adolescent BMI and less healthy dietary intake (Bourcier, Bowen, Meischke, & Moinpour, 2003; Campbell, Crawford, & Ball, 2006; Carper, Fisher, & Birch, 2000). However, as noted previously, evidence for an adverse impact of controlling feeding is mixed with a number of other studies reporting that parental control over the food environment does not predict higher weight or poorer dietary intake in children (Lumeng & Burke, 2006; Robinson, Kiernan, Matheson, & Haydel, 2001).

### Feeding Styles

In contrast to the large literature examining specific parent feeding practices, much less is known about how patterns of parental feeding behaviors (i.e., parent feeding styles) relate to children's eating habits and weight status. Whereas parenting practices describe specific and well-defined strategies related to child feeding, parenting styles are trait-like general typologies of feeding-related attitudes that characterize how parents interact with their child.

In the broader literature on parent-child relationships, parenting styles have been conceptualized in terms of the amount and quality of two underlying dimensions that yield stable patterns of behavior: demandingness and responsiveness (Baumrind, 1971, 1989; Maccoby & Martin, 1983). Demandingness refers to the extent to which parents exhibit control, maturity demands, and supervision in their parenting, whereas responsiveness captures the degree of parental affective warmth, acceptance, and involvement with their children. A four-fold classification of parenting style is described using these two dimensions. The *authoritative* style (high demandingness/high responsiveness) is characterized by parental involvement, nurturance, reasoning, and structure. The *authoritarian* style (high demandingness/low responsiveness) is

characterized by restrictive, punitive, rejecting, and power-assertive behaviors. The *indulgent* style (low demandingness/high responsiveness) is characterized by warmth and acceptance in conjunction with a lack of monitoring of the child's behavior. Finally, the *uninvolved* style (low demandingness/low responsiveness) is characterized by little control or involvement with the child. Research investigating the relationships of these four parenting styles to a variety of outcomes has consistently found that authoritative parenting produces the most positive child outcomes (for reviews see Darling & Steinberg, 1993; Maccoby & Martin, 1983).

A recent review identified 40 studies that have examined the relationship of general parenting style to child weight and/or obesogenic behaviors (Vollmer & Mobley, 2013). Although there is some evidence that authoritative parenting style may lower the risk of childhood overweight/ obesity, mixed findings have been reported. This may be due to differences across studies in terms of the measurement and conceptualization of parenting style and the focus on various outcomes. Additionally, it has been suggested that general parenting style is too broad to significantly impact child weight, eating behaviors, and dietary intake. Although there are some similarities between general parenting style and parent feeding style, emerging evidence suggests that these concepts are not the same and that many parents adopt a different approach to feeding compared with their general parenting style. Illustratively, Hennessy, Hughes, Goldberg, Hyatt, & Economos (2010) found discordance between self-report measures of feeding and parenting style for two-thirds of their sample.

Initial efforts to extend the general framework of parenting described above to child feeding involved labeling specific feeding practices as authoritarian, authoritative,

indulgent, and uninvolved. The first systematic attempt to categorize parental feeding styles was published by Hughes, Power, Fisher, Mueller, & Nicklas (2005), who developed and evaluated a questionnaire based on Maccoby and Martin's (1983) four-fold classification of parenting style. Parental feeding styles involve the implementation of parents' food-related beliefs and feeding practices into consistent approaches taken by parents when interacting with their child during meals and snacks. Unlike feeding practices, which are defined by goal-directed behaviors and specific methods of controlling the child's food intake, feeding styles involve the general emotional climate during feeding. These feeding styles are relatively stable over time and can alter the effectiveness of specific feeding practices (Darling & Steinberg, 1993; Vollmer & Mobley, 2013).

Similar to general parenting style, feeding style is determined by the amount and quality of parental demandingness and responsiveness. Demandingness in feeding refers to *how much* the parent encourages the child to eat, through tactics such as specific directives (e.g., "Clean your plate"). Responsiveness refers to *how* the parent encourages the child to eat and can either be child-centered (e.g., approaches higher in their level of warmth and responsiveness such as reasoning, praise, providing rationales) or parent-centered (e.g., approaches with lower levels of warmth and responsiveness such as punishment, restriction; Hughes et al., 2005; Johnson & Birch, 1993).

Literature examining the relationship between parent feeding styles and child weight generally suggests that children of parents who demonstrate an indulgent/permissive style or an uninvolved style have higher BMI, whereas children of parents exhibiting an authoritative style have lower BMI (Berge, Wall, Loth, &

Neumark-Sztainer, 2010; Hubbs-Tait, Dickin, Sigman-Grant, Jahns, & Mobley, 2013). In this small but growing literature, the most consistent associations with higher child weight status and an obesogenic home environment have been reported for the indulgent feeding style (Hennessy, Hughes, Goldberg, Hyatt, & Economos, 2012; Hubbs-Tait et al., 2013; Hughes et al., 2005; Hughes, Shewchuk, Baskin, Nicklas, & Qu, 2009; Johnson, Welk, Saunt-Maurice, & Ihmels, 2012; Olvera & Power, 2010; Tovar et al., 2012). Rhee, Lumeng, Appugliese, Kaciroti, & Bradley (2006) found that children of indulgent and uninvolved mothers were twice as likely to be overweight compared with children of mothers with an authoritative approach. A study by Tovar et al. (2012) found that the indulgent feeding style explained 26% of the variance in child BMI after controlling for child gender and age, maternal age, ethnicity, level of education, and maternal BMI. The association between indulgent feeding style and child weight has also been found in a study using observational methodology to assess mealtime behaviors. In one study, mothers exhibited more permissive mealtime behaviors with heavier children than normal weight children (Moens, Braet, & Vanderwalle, 2013).

Importantly, the association between indulgent feeding and higher child weight has been found to persist in some studies after controlling for known correlates of child weight including child temperament (where difficult temperament is linked to increased weight gain before age 3), age, and parent BMI (Hughes, Shewchuk, Baskin, Nicklas, & Qu, 2008). However, the effect of race and ethnicity on this relationship is unclear. For example, one study that compared children of parents with an indulgent feeding style to children of parents with other feeding styles found this association only with Hispanic boys (Hughes et al., 2011).



## CHAPTER IV

### CHILD EATING BEHAVIORS, PARENT FEEDING STYLES, AND CHILD WEIGHT

Few studies have examined both child eating behaviors and food-related parenting variables, and most of these have focused on feeding practices rather than general feeding styles (Birch, Fisher, & Davison, 2003; Fisher & Birch, 1999; Francis & Birch, 2005; Powers et al., 2006; Rodgers et al., 2013). In general, findings from these studies highlight the adverse impact of controlling/restrictive feeding practices with respect to children's eating behaviors. In a longitudinal study, Birch, Fisher, and Davison (2003) examined the use of restriction in feeding interactions between mothers and their 5 year-old daughters over time. They found that mothers' use of restrictive feeding practices promoted overeating in response to the presence of palatable foods. Girls who were already overweight and who were subject to higher levels of restriction showed the greatest increase in overeating from age 5 to 9. Thus, although well intentioned, restricting children's consumption of highly palatable foods during feeding interactions appears to produce the counterproductive result of heightening children's preference for the restricted foods and overconsumption of those foods when they are available (Fisher & Birch, 1999; Lee & Birch, 2002).

In a study examining the relationship between parent feeding practices and child eating behaviors in 7 to 9 year-olds independent of child weight status, results showed that children's eating habits were differentially associated with maternal restricting and pressuring feeding strategies (Webber, Cook, Hill, & Wardle, 2010). Children of mothers with restrictive feeding practices showed higher levels of food responsiveness. Mothers

who used pressuring strategies to encourage their child to eat had children with lower food enjoyment, higher fussiness, and slower eating. Jansen et al. (2012) examined parent feeding practices, child eating behaviors, and child BMI in a sample of four year-old children in the Netherlands. In this study, higher parent food restriction was associated with higher child food responsiveness and more emotional overeating. Parental pressure to eat was also positively associated with higher food responsiveness as well as more child enjoyment of food. More recently, Rodgers and colleagues (2013) found that instrumental feeding (i.e., using food as a reward), restriction, emotional feeding, encouragement to eat, weight-based restriction, and fat restriction were prospectively associated with child emotional eating, overeating, and high enjoyment of food and appetite. Importantly, this study also assessed maternal monitoring, the extent to which mothers keep track of a child's eating. This was found to be negatively associated with enjoyment of food and appetite (i.e., food approach behaviors).

Few previous investigations have considered child eating behaviors, parental feeding, and child weight simultaneously, and only one known study has focused specifically on parent feeding styles. In the Jansen et al. (2012) study described above, the child eating behaviors discussed accounted for 33% of the association between food restriction and child BMI and 47% of the association between pressure to eat and child BMI (Jansen et al., 2012). While these findings highlight the importance of considering child eating behavior in relation to parental feeding behaviors and child weight status, they do not address specific child eating behaviors as a mechanism linking particular parent feeding styles and child weight outcomes. To our knowledge, only three previous studies have explicitly examined mechanisms linking these variables, and all of these

have explored parent feeding constructs as mediators. In the first study, Francis and Birch (2005) found that overweight mothers who reported more use of restrictive feeding practices had daughters who showed greater increases in both eating in the absence of hunger and overall BMI increase between the ages of 5 and 9. Results show that daughters' eating in the absence of hunger mediated the relationship between maternal restriction at age 5 and daughters' BMI changes from age 5 to age 9 for daughters of overweight mothers but not normal weight mothers. In the second study, Joyce and Zimmer-Gembeck (2009) tested child disinhibited eating as a potential mediator between parental restriction and higher child BMI using a sample of 230 caregivers and their children aged 4 to 8 years. They found that children's disinhibited eating partially mediated the association between restrictive feeding and child BMI, suggesting that parent restriction has an indirect effect on child weight via child disinhibited eating behaviors. Frankel et al. (2014) examined preschoolers' levels of self-regulation (i.e., starting and stopping eating in response to hunger and satiety cues) as a mechanism linking parent feeding style and child weight status in a diverse sample of low-income Hispanic and black parents. It was found that children of parents with an indulgent feeding style had higher BMI z-scores, higher levels of food responsiveness, and lower levels of satiety responsiveness. The association between an indulgent feeding style and child weight status was mediated by children's ability to self regulate in the eating context.

Additional research focusing specifically on parent feeding styles is needed. Moreover, the possible moderating role of parent feeding style has not been examined in previous studies. This is an important direction for further research, given results from a

recent study investigating interactions between parent feeding practices, feeding styles, and children's dietary intake (Hennessy et al., 2012). In this study, permissive feeding style was found to alter the association between parenting monitoring of child food intake and children's consumption of low nutrient dense foods, such that higher levels of monitoring were associated with higher levels of low nutrient dense food consumption in children of permissive mothers but lower levels of consumption among children whose mothers were not permissive mothers (Hennessy et al., 2012).

## CHAPTER V

### THE CURRENT STUDY

Both genetic and environmental factors strongly affect a child's likelihood of becoming overweight or obese; however, children's eating behaviors and food-related parenting represent key influences on child weight outcomes. The literature reviewed above reveals important gaps in current knowledge regarding children's risk for developing obesity in early childhood. A prominent gap relates to the scant research focusing on parent feeding styles. Most prior investigations have assessed parenting practices (e.g., food restriction, emotional feeding, encouragement to eat, weight-based restriction, and fat restriction), with few studies exploring stylistic differences in parental approaches in relation to child obesity risk factors. As noted previously, parent feeding styles merit consideration because they set the emotional climate for parent-child feeding interactions and are consistent across contexts (Vollmer & Mobley, 2013). Available evidence is compelling regarding the potential for certain feeding styles (e.g., indulgent, authoritarian) to increase the risk for excessive weight gain in young children, but there is a need to better understand the specific mechanisms linking food-related parenting styles and children's weight outcomes. In the current study, the author addresses this research gap by examining if various parent feeding styles affect the strength or direction of the relationship between child eating behaviors and child BMI.

#### Study Objectives and Specific Hypotheses

This study has three objectives. The first objective was undertaken to enhance basic understanding of parent feeding styles by characterizing the prevalence and correlates of different parent feeding styles in an ethnically and socio-economically

diverse sample of mother-child dyads living in southern Mississippi, a state with among the highest rates of childhood obesity in the nation (Robert Wood Johnson Foundation, 2013). Specifically, this includes (a) using a reliable and valid measure to systematically classify parent feeding styles based on Maccoby and Martin's (1983) four-fold classification of parenting style and (b) testing whether parent feeding styles vary as a function of maternal characteristics (e.g., age, race/ethnicity, educational attainment, marital status, weight status) and child characteristics (age and gender). Previous research on feeding styles has indicated that approximately 33% of mothers have an authoritarian style, 33% have an indulgent style, 17% have an authoritative style, and 17% have an uninvolved style (Hughes et al., 2012), and the author anticipates similar classification distributions in the sample (Hypothesis 1a). It is also anticipated that mothers with lower levels of education and higher weight status will be more likely to be classified as having authoritarian or indulgent feeding styles (Kroller & Warschburger, 2008; Hypothesis 1b) and African American mothers will be more likely to endorse an uninvolved feeding style (Hughes et al., 2005; Patrick, Nicklas, Hughes, & Morales, 2005) (Hypothesis 1c).

The second objective is to examine whether there are mean level differences in child eating behaviors among the four feeding style groups. Previous research suggests a link between controlling feeding practices and unhealthy child eating behaviors, including eating in the absence of hunger, higher desire to eat, and a decreased focus on internal appetite cues (Birch, Fisher, & Davison, 2003; Jansen et al., 2012; Rodgers et al., 2013). It is therefore anticipated that children of mothers with an authoritarian feeding style will have lower satiety responsiveness and higher emotional overeating and food responsiveness (Hypothesis 2a). Consistent with previous research on indulgent feeding

practices and child eating behaviors, it is also predicted that children of mothers with an indulgent feeding style will have higher emotional overeating and higher enjoyment of food (Rodgers et al., 2013) (Hypothesis 2b).

The third objective is to examine the associations of maternal feeding style and child eating behaviors to child weight status and to determine whether maternal feeding style and child eating behaviors interact in the prediction of child weight status (exploratory analyses). Consistent with previous findings, it is hypothesized that indulgent, authoritarian, and uninvolved feeding styles will be associated with higher weight status (Hennessy et al., 2010; Olvera & Power, 2010; Tovar et al., 2012) (Hypothesis 3a) and that authoritative feeding style will be associated with lower child weight status (Berge et al., 2010; Hubbs-Tait et al., 2013) (Hypothesis 3b). With respect to child eating behaviors, consistent with available data, it is hypothesized that each child eating behavior will be uniquely related to child weight status. Specifically, it is anticipated that low satiety responsiveness and high enjoyment of food, emotional eating, food responsiveness, and eating speed will be associated with higher child weight status (Hypothesis 3c). Given the lack of previous research examining interactions between child eating behaviors and parent feeding variables in the prediction of child weight outcomes, specific hypotheses for the exploratory moderation analyses are not provided.

## CHAPTER VI

### METHODS

#### Participants

Participants were mothers and their preschool-aged children. Recruitment occurred in three ways. First, mothers were recruited through the online SONA research database at The University of Southern Mississippi. Second, flyers and study advertisements were placed in community locations throughout Hattiesburg, Mississippi in an attempt to increase diversity of the sample. Third, mothers were recruited through preschool programs located in Hattiesburg, Mississippi and Petal, Mississippi. Preschool directors were contacted via telephone, had the study process and rationale explained to them, and asked if they would be willing to allow the research team to collect data at their program. Mothers were notified about the study via announcements sent home with their child several days prior to the scheduled data collection day.

The final sample included 128 mothers ( $M$  age = 32.00 years,  $SD$  = 5.01) of preschoolers ( $M$  age = 3.76 years,  $SD$  = .71, 50.0% male) who completed the CFSQ and could be classified into one of the four parent feeding style groups. Maternal and child descriptive characteristics are presented in Tables 1 and 2, respectively. The sample was predominantly Caucasian (81.25%), with African American being the next largest race/ethnicity group represented (15.63%). The majority of mothers reported being married (82.03%) and having completed at least a college-level education (70.08%). Over two-thirds of mothers (68.75%) reported a total family income greater than \$50,000. The average maternal BMI was 27.13 kg/m<sup>2</sup> ( $SD$  = 7.14), with 3.13% of mothers categorized



as underweight, 46.09% as normal weight, 27.34% as overweight, and 23.44% as obese according to guidelines of the Centers for Disease Control and Prevention (CDC).

Table 1

*Maternal Descriptive Characteristics (N = 128)*

Variable	<i>n (%)</i>	<i>M (SD)</i>	Range
Age (years) <sup>a</sup>		32.00 (5.01)	21-45
Race/ethnicity			
Black/African American	20 (15.63)		
Caucasian	104 (81.25)		
Hispanic	3 (2.34)		
Native American	1 (0.78)		
Marital status			
Single	19 (14.84)		
Married	105 (82.03)		
Legally separated	1 (0.78)		
Divorced	3 (2.34)		
Educational attainment			
Less than high school	2 (1.57)		
High school diploma	6 (4.72)		
Some college	30 (23.62)		
College degree	56 (44.09)		
Some graduate school	5 (3.94)		
Graduate degree	28 (22.05)		
Total family income			
<10,000	8 (6.25)		
10-29,000	14 (10.94)		
30-49,000	18 (14.06)		
50-69,000	28 (21.88)		
70-89,000	16 (12.50)		
>90,000	44 (34.38)		

Table 1 ( continued).

Variable	<i>n</i> (%)	<i>M</i> ( <i>SD</i> )	Range
Height (m)		1.64 (0.06)	1.47-1.79
Weight (kg)		73.14 (20.05)	46.50-140.90
Body Mass Index		27.04 (7.14)	17.48-51.57
BMI Category			
Underweight	4 (3.13)		
Normal weight	59 (46.09)		
Overweight	35 (27.34)		
Obese	30 (23.44)		

Note. <sup>a</sup>Data missing for one participant.

Table 2

*Child Descriptive Characteristics (N = 128)*

Variable	<i>n</i> (%)	<i>M</i> ( <i>SD</i> )	Range
Child gender			
Male	64 (50.00)		
Female	64 (49.00)		
Child age (years)		3.76 (0.71)	3-5
Height (cm) <sup>a</sup>		103.30 (8.64)	71.12-121.92
Weight (kg) <sup>b</sup>		17.18 (2.75)	10.5-24.5
BMIz <sup>c</sup>		0.09 (1.63)	-6.97-4.98
BMI percentile <sup>c</sup>		55.23 (32.66)	0-100

Note. <sup>a</sup>Data missing for 5 children. <sup>b</sup>Data missing for 22 children. <sup>c</sup>Data missing for 24 children.

## Measures

### *Demographic characteristics*

A background questionnaire developed for the present study was used to collect socio-demographic information including maternal age, educational attainment, marital status, and family history of obesity and obesity-related diseases. The questionnaire was also used to obtain child information including age, gender, and parent-reported child height and weight.

### *Maternal feeding style*

The Caregiver's Feeding Styles Questionnaire (CFSQ) used to determine mothers' feeding style (Hughes et al., 2005). This measure consists of 19 questions describing verbal and physical feeding strategies used by parents to get their children to eat. Parents are asked to rate on a 5-point scale ranging from *never* to *always* the extent to which they use strategies such as begging their child to eat or allowing their child to choose their own foods. Questions are designed to represent the two dimensions of child-centered feeding directives (responsiveness) and parent-centered feeding directives (demandingness). A cross-classification of scores on these two dimensions categorizes parents into one of four feeding categories: authoritative, authoritarian, indulgent, or uninvolved. The CFSQ was selected for the current study based on high internal consistency for both demandingness ( $\alpha = .85$ ) and responsiveness ( $\alpha = .86$ ), supporting the reliability of the measure (Hughes et al., 2005). Convergent validity of the CFSQ was tested in comparisons with the Parenting Dimensions Inventory Short Version (PDI-S) and the Child Feeding Questionnaire (CFQ), showing a strong predictive relationship with both questionnaires. Reliability of the CFSQ was also supported through its method

of development, through consultations with specialists in nutrition and psychology reviewing videotaped home and classroom observations in order to develop accurate items. Test-retest reliability was used with 11% of study participants with a 1-2 week retest period, yielding a Pearson's correlation for the demandingness subscale of  $r = .85$  and a correlation of the responsiveness subscale of  $r = .82$  (Hughes et al., 2005).

### *Child eating behaviors*

The Child Eating Behavior Questionnaire (CEBQ; Wardle et al., 2001a) is a multidimensional parent-report questionnaire that measures child eating behaviors. The questionnaire was designed to assess eating behaviors associated with weight problems in children ages 2 to 7 based on both findings in previous literature and parent reports of child behavior from qualitative interviews. The CEBQ is a 35-item measure with responses ranging from 1 (*never*) to 5 (*always*). It includes seven subscales: food responsiveness, enjoyment of food, emotional overeating, desire to drink, satiety responsiveness, emotional undereating, and fussiness. Means for each subscale are calculated provided at least 80% of items were completed. Inter-correlations between subscales demonstrated that positive eating responsive scales (food responsiveness, enjoyment of food, and emotional overeating) tended to be positively inter-correlated, while these scales negatively correlated with the negative scales (satiety responsiveness and slowness in eating). This questionnaire was chosen for its use as a specific assessment of eating behaviors related to obesity and underweight in young children. Each subscale demonstrates acceptable levels of internal consistency, and the CEBQ also shows strong test-retest reliability, with no significant mean differences found between scores after a two-week period (Wardle et al., 2001a). Examination of Cronbach's

coefficient alphas indicated that all scales demonstrated adequate internal reliability in the current sample ( $\alpha$ 's = .74-.92).

#### *Child Body Mass Index*

Age- and sex-specific body mass index (BMI) percentiles and z-scores were calculated for children. BMI percentiles and z-scores were used rather than raw values because BMI varies by age and between boys and girls. Measured (versus parent-reported) heights and weights were used for these calculations when available. In cases when the preschooler was not present during data collection, BMI percentiles and z-scores were based on weight and height data provided by mothers. The procedure for obtaining child height and weight was as follows. Weight was measured using a Detecto SlimPRO low profile health care scale. Children were weighed in their street clothes and were only be asked to remove their shoes and any bulky clothing items they might be wearing (e.g., jacket) prior to stepping on the scale. Height was measured using a portable Seca 213 stadiometer. Ocker and Melrose (2008) assessed the diagnostic value of BMI versus percent fat in a multi-ethnic population ( $N = 596$ ), finding validity coefficients ranging from  $r = .85-.99$ , suggesting that BMI is an acceptable proxy measure of adiposity. Child BMI percentiles and z-scores were determined using the CDC's SAS macro that references the CDC 2010 age- and gender-specific growth charts, using the child's measured or reported height, weight, and age (CDC, 2010).

#### *Maternal Body Mass Index*

Mothers were weighed and measured for the purposes of calculating their BMI. Weight was measured using either a portable Detecto SlimPRO low profile health care scale (for data collection at preschools) or a wireless Seca 703 digital column scale (for

lab-based data collection). Mothers were weighed in their street clothes after removing their shoes and any bulky clothing items they might be wearing (e.g., jacket). Height was measured using a portable Seca 213 stadiometer (for data collection at preschools) or the Seca 703 column scale (for lab-based data collection). For adult males and females, a continuous BMI variable was calculated as  $\text{kg/m}^2$ . Based on CDC guidelines, a four-level categorical variable was also created, as follows: mothers were considered underweight with a BMI under 18.5, normal weight with a BMI ranging from 18.5 to 24.9, overweight with a BMI from 25.0 to 29.9, and obese with a BMI above 30.0.

### Procedures

This study was reviewed and approved by the Internal Review Board at The University of Southern Mississippi. Participants recruited via the SONA research database, and respondents of community-based advertisements completed the study in an on-campus research lab. A trained research assistant explained the purpose of the study, discussed the benefits and risks associated with participation, and assured confidentiality of all responses. After their eligibility was verified and mothers consented to participate, they completed the background questionnaire, CFSQ, CEBQ, and had their height and weight measured by the research assistant. Several mothers ( $n = 4$ ) who wished to participate were pregnant and were invited to participate because pregnancy was not an exclusion criterion for this study. Pregnant mothers' height was measured using laboratory equipment, but they were asked to self-report their pre-pregnancy weight and this value was used for analyses. Total participation time was approximately 30 minutes. In appreciation for their time, participants recruited via the SONA database received class

credit, whereas community participants received a gift card to a national retailer valued at \$20.00.

Participants recruited from preschools completed the informed consent process and study questionnaires on site at their child's preschool. Mothers' height and weight were measured using a portable scale and stadiometer. Heights and weights of children were also obtained if they were present at the time of their mothers' participation.

## CHAPTER VII

### RESULTS

#### Preliminary Analyses

Several socio-demographic variables were recoded prior to conducting the main study analyses due to small numbers of mothers within some categories, as follows: maternal race/ethnicity (0 = white/Caucasian, 1 = minority race/ethnicity), marital status (0 = single/never married, legally separated, divorced, or widowed, 1 = married), maternal educational attainment (0 = less than high school, high school diploma, or some college, 1 = college degree, some graduate school, or graduate degree), and total family income (0 = < \$10,000-49,999, 1 = > \$50,000).

Due to missing height and/or weight data, child BMI<sub>z</sub> could not be calculated for a subgroup of participants. Analyses were conducted to determine whether these data were missing systematically. Using the recoded variables described above, comparisons were made between the group with complete data ( $n = 104$ , representing 81.2% of the total sample) and the group missing child BMI<sub>z</sub> scores ( $n = 24$ , representing 18.8% of the total sample) using chi-square and  $t$  tests. Three significant group differences were found. First, with respect to maternal age ( $t(125) = -3.34, p = .001$ ), such that mothers in the group missing BMI<sub>z</sub> data were younger than mothers in the group with BMI<sub>z</sub> data (29.0 years versus 32.7 years). Second, the group differed in income ( $X^2(1, N = 128) = 7.22, p = .007$ ), with more mothers with income < \$49,999 in the group missing child BMI<sub>z</sub> data than would be expected by chance. Third, the group missing BMI<sub>z</sub> data had lower scores on the CEBQ fussiness scale than the group with BMI<sub>z</sub> data (2.69 versus 3.08;  $t(126) = -1.99, p = .049$ ). Results indicated that there were no differences between these groups



with respect to child age ( $t(126) = -.70, p = .49$ ), child gender ( $X^2(1, N = 128) = .21, p = .65$ ), maternal education ( $X^2(1, N = 127) = 3.57, p = .06$ ), maternal BMI ( $t(126) = 1.76, p = .08$ ), feeding style categorization ( $X^2(3, N = 128) = 3.40, p = .33$ ), and all but one of the child eating behavior scales (emotional undereating  $t(126) = 1.02, p = .31$ ; emotional overeating  $t(126) = -1.53, p = .13$ ; food responsiveness  $t(126) = -.35, p = .73$ ; food enjoyment  $t(124) = .45, p = .66$ ; satiety responsiveness  $t(126) = -.20, p = .84$ ; desire to drink  $t(126) = .18, p = .86$ ). Group comparisons could not be made for marital status and race/ethnicity due to small numbers of participants within cells for the chi-square analyses.

#### Objective 1: Prevalence and Correlates of Mothers' Feeding Styles

Psychometric properties of the CFSQ revealed internal consistency scores of  $\alpha = .81$  for the demandingness subscale and  $\alpha = .65$  for the responsiveness subscale. Examination of feeding style classifications revealed that 15.63% of mothers were categorized as having an authoritative feeding style ( $n = 20$ ), 34.34% were authoritarian ( $n = 44$ ), 28.13% were indulgent ( $n = 36$ ), and 21.88% were uninvolved ( $n = 28$ ). Chi-square analyses were conducted to examine the association between the categorical feeding style variable and categorical socio-demographic variables, and One Way Analysis of Variance (ANOVA) was used to determine whether a relationship existed between feeding style and continuous socio-demographic variables.

Results indicated that there was not a significant relationship between feeding style and any of the maternal socio-demographic variables examined, including maternal age ( $F(3, 123) = 1.26, p = .29$ ), race/ethnicity ( $X^2(3, N = 128) = 6.65, p = .08$ ), marital status ( $X^2(3, N = 128) = 0.54, p = .91$ ), income ( $X^2(3, N = 128) = 0.98, p = .81$ ), or

educational attainment ( $X^2(3, N = 128) = 5.80, p = .12$ ). With respect to child characteristics, maternal feeding style was not associated with child age ( $F(3, 124) = 1.58, p = .20$ ) but was significantly related to child gender ( $X^2(3, N = 128) = 9.47, p = .04$ ). Post hoc probing of this finding indicated that there were significantly more boys in the authoritarian feeding style group, and significantly more girls in the indulgent feeding style group, than would be expected by chance.

Associations of parent feeding style to maternal weight status were examined next. Three maternal variables were examined: mothers' BMI (a continuous variable), BMI category (a four-level categorical variable), and maternal overweight/obesity (a two-level categorical variable, with 0 = not overweight/obese, 1 = overweight/obese). A one-way ANOVA was used to test for differences in mothers' BMI as a function of feeding style group. Mothers' BMI did not differ significantly across the four feeding style groups, ( $F(3, 124) = 0.17, p = .91$ ). Chi-square analyses were conducted to examine feeding style in relation to the two categorical indicators of maternal weight status. Results of these analyses indicated that there was not a relationship between feeding style and either maternal BMI category ( $X^2(9, N = 128) = 1.34, p = .99$ ) or maternal overweight/obesity ( $X^2(3, N = 128) = 0.42, p = .94$ ).

#### Objective 2: Feeding Style Group Differences in Child Eating Behaviors

Descriptive statistics and psychometric properties of the CEBQ scales are presented in Table 3. Feeding style group differences in CEBQ scale score means were investigated using ANCOVA that controlled for maternal BMI. Table 4 shows CEBQ scale scores by parent feeding style group. Significant group differences were observed with respect to five of the seven eating behaviors examined, with most differences found

between the authoritarian feeding style group and either indulgent or uninvolved groups. Children of mothers classified as having an authoritarian feeding style had higher scores on emotional undereating compared with children of mothers classified as uninvolved (3.22 versus 2.43), and higher scores on emotional overeating compared with children of mothers classified as indulgent (1.73 versus 1.44). Authoritarian feeding style was also associated with lower mean scores on food enjoyment and higher scores on satiety responsiveness compared with both the indulgent and uninvolved feeding styles (food enjoyment 3.20 versus 3.85 and 3.76, respectively; satiety responsiveness 3.37 versus 3.06 and 2.88, respectively). Children of mothers classified as indulgent had significantly lower mean scores on the fussiness scale compared with children of mothers classified as either authoritative or authoritarian (2.43 versus 3.12 and 3.46, respectively).

Table 3

*Descriptive Statistics and Psychometric Properties of the CEBQ scales (N = 128)*

Scale	<i>M</i>	<i>SD</i>	$\alpha$	Potential	Actual	Skew
Emotional undereating	2.90	0.92	0.80	1-5	1-5	0.16
Emotional overeating	1.56	0.50	0.75	1-5	1-3.25	0.63
Food responsiveness <sup>a</sup>	2.36	0.69	0.74	1-5	1-4.20	0.57
Food enjoyment	3.53	0.77	0.88	1-5	2-5	0.09
Satiety responsiveness	3.16	0.54	0.75	1-5	1.63-4.75	0.18
Fussiness	3.01	0.88	0.92	1-5	1-5	-0.03
Desire for drinks	3.28	1.07	0.88	1-5	1.33-5	0.04

Note. <sup>a</sup>Data missing for two participants.

Table 4

*Feeding Style Group Differences in Mean Scores on CEBQ Scales*

	Author- itative (n = 18)	Author- itarian (n = 38)	Indulgent (n = 27)	Uninvolved (n = 21)	<i>F</i>	<i>p</i>
Emotional undereating	3.11 <sub>a</sub>	3.22 <sub>a</sub>	2.75 <sub>ab</sub>	2.43 <sub>b</sub>	4.07	.0039
Emotional overeating	1.44 <sub>ab</sub>	1.73 <sub>a</sub>	1.44 <sub>b</sub>	1.51 <sub>ab</sub>	4.14	.0035
Food responsiveness	2.21	2.41	2.24	2.54	1.12	.3517
Food enjoyment	3.37 <sub>ab</sub>	3.20 <sub>a</sub>	3.85 <sub>b</sub>	3.76 <sub>b</sub>	5.61	.0003
Satiety responsiveness	3.23 <sub>ab</sub>	3.37 <sub>a</sub>	3.06 <sub>b</sub>	2.88 <sub>b</sub>	4.46	.0021

Note. N = 128 except for food responsiveness (n = 126). Results were obtained from ANCOVA analyses that controlled for maternal BMI. Means that have no subscript in common are significantly different from each other (Tukey's HSD,  $p < 0.05$ ).

### Objective 3: Maternal Feeding Style, Child Eating Behaviors and Child Weight Status

A series of multiple linear regression analyses were conducted to (a) examine the relations of maternal feeding style and child eating behaviors to child BMIz, and (b) to determine whether maternal feeding style and child eating behaviors interact in the prediction of child BMIz. Prior to conducting these analyses, the associations of child BMIz to child and maternal characteristics (the recoded dichotomous variables used to investigate objective one were examined to determine whether any of these variables should be included as covariates in the regression analysis for objective two. No associations were found between child BMIz and child age ( $r = -.06$ ,  $p = .56$ ) or gender ( $t(102) = 1.66$ ,  $p = .56$ ). Likewise, child BMIz was not related to maternal age ( $r = -.48$ ,  $p = .14$ ), marital status ( $t(102) = .58$ ,  $p = .56$ ), education ( $t(102) = 1.88$ ,  $p = .06$ ), income

( $t(102) = .90, p = .37$ ), or race/ethnicity ( $t(102) = 1.37, p = .17$ ). A significant positive correlation was observed between child BMIz and maternal BMI ( $r = .23, p = .02$ ).

Regression analyses were conducted using the PROCESS macro developed by Hayes (2013). This macro uses Ordinary Least Squares (OLS) regression to estimate direct and indirect effects in moderation models and provide simple slopes and regions of significance for probing interactions. The current analysis was conducted using 5,000 bootstrapped samples. For the regressions, the four-level feeding style variable was dummy coded with authoritarian feeding serving as the referent group for uninvolved, indulgent, and authoritative feeding styles. Interactions between the seven child eating behavior scales from the CEBQ and uninvolved, indulgent, and authoritarian feeding styles were tested in separate models because PROCESS does not accommodate more than two moderating variables within the same model. In all models, maternal BMI was included as a covariate along with the two dummy coded feeding style variables that were not being examined as moderators, and child BMIz was the criterion variable. Predictor variables were the CEBQ scales, uninvolved, indulgent, and authoritarian feeding style dummy coded variables, and the interaction terms between eating behavior and feeding style. Continuous predictor variables were centered automatically in PROCESS prior to the creation of interaction terms.

Results of the regression analyses are summarized in Tables 5-11. No significant main effects were found between the feeding style variables and child BMIz. Significant main effects were observed between four of the seven CEBQ scales and child BMIz. Higher levels of food responsiveness and food enjoyment were associated with higher child BMIz scores (results shown in Tables 7 and 8). Higher levels of satiety

responsiveness were associated with lower child BMIz (Table 9). Higher levels of fussiness were also associated with lower child BMIz; however, this effect cannot be interpreted in light of the significant interaction between this eating behavior and maternal feeding style (described below).

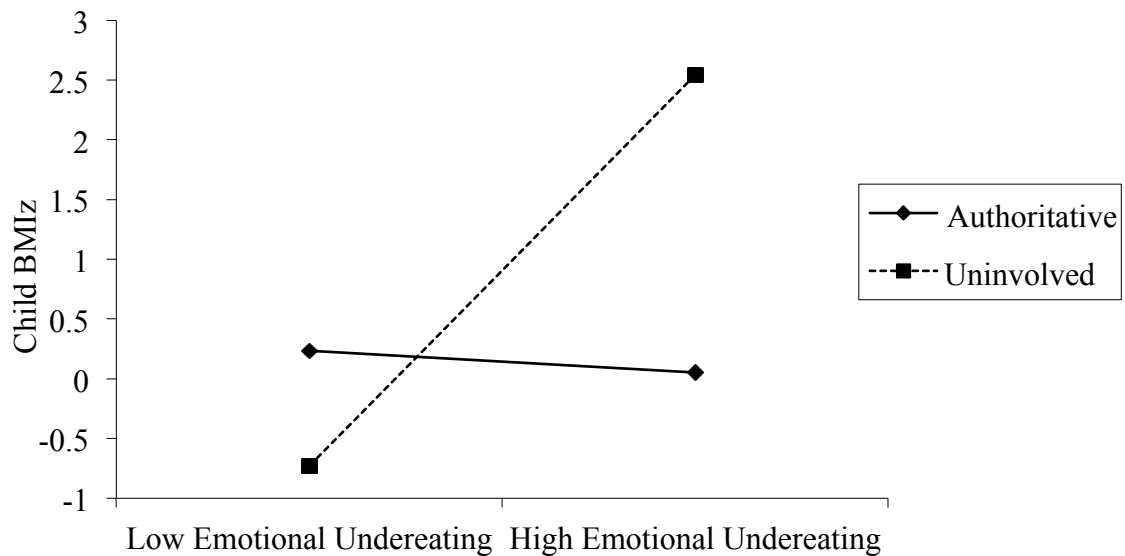
Three significant interactions between child eating behaviors and maternal feeding styles were found. Results for emotional undereating are summarized in Table 5. The overall model testing the interaction between uninvolved feeding style and emotional undereating was significant ( $(6, 97) = 3.30, p = .0054$ ) and accounted for 17.0% of variance in child BMIz. The interaction between uninvolved feeding style and emotional undereating was a significant predictor of child BMIz (unstandardized coefficient = 1.53,  $p = .0009$ ), indicating that uninvolved feeding style moderates the relation of emotional undereating to child BMIz. As shown in Figure 1, there is a significant positive association between emotional undereating and child BMIz, but only among children of mothers with an uninvolved feeding style ( $b = 1.45, p = .0005$ ).

Table 5

*Summary of multiple regression analyses predicting child BMIz from emotional undereating, mothers' feeding style, and the interaction between emotional undereating and feeding style*

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Model 1				
Emotional Undereating	.23	.17	1.33	.1868
Authoritarian	-.07	.44	-.15	.8775
Indulgent	-.11	.47	-.23	.8156
Uninvolved	.74	.56	1.32	.1892
Uninvolved X Emotional Undereating	1.53	.45	3.44	.0009
Model summary	$F(6, 97) = 3.30, p = .0054, R^2 = .17$			
Model 2				
Emotional Undereating	.21	.18	1.15	.2533
Authoritarian	-.06	.46	-.13	.8942
Indulgent	.00	.49	-.01	.9922
Uninvolved	.14	.55	.25	.8002
Indulgent X Emotional Undereating	-.57	.40	-1.41	.1630
Model summary	$F(6, 97) = 1.53, p = .1759, R^2 = .09$			
Model 3				
Emotional Undereating	.20	.18	1.09	.2798
Authoritarian	-.05	.47	-.10	.9171
Indulgent	-.03	.50	-.07	.9473
	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Uninvolved	.02	.56	.03	.9742
Authoritarian X Emotional Undereating	-.07	.38	-.18	.8575
Model summary	$F(6, 97) = 1.18, p = .3212, R^2 = .07$			

Note. All analyses controlled for maternal BMI score. Referent group for feeding style was authoritative.



*Figure 1.* Relation between emotional undereating, uninvolved feeding style, and child BMI. Higher levels of emotional undereating are associated with higher child BMI in the presence of uninvolved maternal feeding style.

Results for emotional overeating are summarized in Table 6. The overall model testing the interaction between uninvolved feeding style and emotional overeating was significant  $F(6, 97) = 2.81, p = .0146$  and accounted for 15.0% of variance in child BMIz. The interaction between uninvolved feeding style and emotional overeating was a significant predictor of child BMIz (unstandardized coefficient = 2.70,  $p = .0026$ ), indicating that uninvolved feeding style moderates the relation of emotional overeating to child BMIz (Figure 2). Higher levels of emotional overeating were associated with higher child BMIz but only among children of mothers with an uninvolved feeding style ( $b = 2.60, p = .0018$ ).

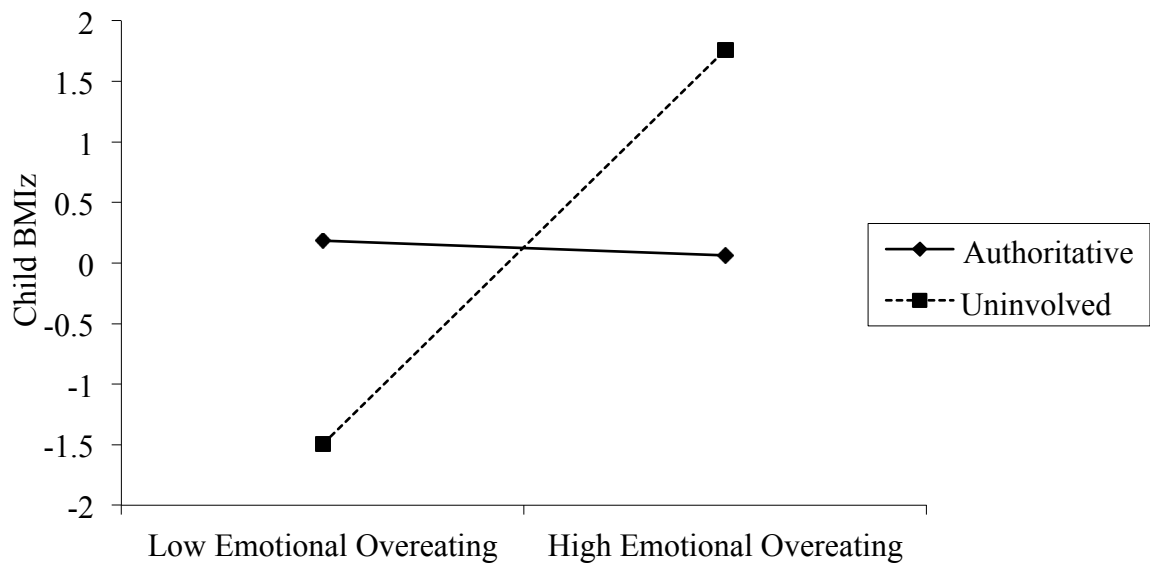


Table 6

*Summary of multiple regression analyses predicting child BMIz from emotional overeating, mothers' feeding style, and the interaction between emotional overeating and feeding style*

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Model 1				
Emotional Overeating	.45	.33	1.37	.1728
Authoritarian	-.03	.45	-.07	.9428
Indulgent	-.07	.47	-.16	.8747
Uninvolved	-.09	.50	-.17	.8644
Uninvolved X Emotional Overeating	2.70	.87	3.09	.0026
Model summary	$F(6, 97) = 2.81, p = .0146, R^2 = .15$			
Model 2				
Emotional Overeating	.29	.33	.87	.3843
Authoritarian	-.23	.47	-.49	.6277
Indulgent	-.23	.49	-.46	.6484
Uninvolved	-.23	.51	-.45	.6513
Indulgent X Emotional Overeating	-1.37	.76	-1.81	.0740
Model summary	$F(6, 97) = 1.68, p = .1329, R^2 = .09$			
Model 3				
Emotional Overeating	.34	.34	1.01	.3161
Authoritarian	-.13	.47	-.27	.7879
Indulgent	-.10	.49	-.20	.8444
Uninvolved	-.23	.52	-.44	.6595
Authoritarian X Emotional	-.58	.66	-.89	.3775
Overeating				
Model summary	$F(6, 97) = 1.24, p = .2910, R^2 = .07$			

Note. All analyses controlled for maternal BMI score. Referent group for feeding style was authoritative.



*Figure 2.* Relation between emotional overeating, uninvolved feeding style, and child BMI. Higher levels of emotional overeating are associated with higher child BMI in the presence of uninvolved maternal feeding style.

Table 7

*Summary of multiple regression analyses predicting child BMIz from food responsiveness, mothers' feeding style, and the interaction between food responsiveness and feeding style*

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Model 1				
Food Responsiveness	.53	.23	2.33	.0222
Authoritarian	-.22	.46	-.48	.6320
Indulgent	-.09	.49	-.19	.8493
Uninvolved	-.55	.53	-1.03	.3045
Uninvolved X Food Responsiveness	.56	.52	1.10	.2877
Model summary	$F(6, 95) = 2.26, p = .0435, R^2 = .13$			
Model 2				
Food Responsiveness	.55	.23	2.41	.0180
Authoritarian	-.25	.47	-.54	.5930
Indulgent	-.09	.50	-.18	.8584
Uninvolved	-.45	.53	-.84	.4006
Indulgent X Food Responsiveness	.00	.56	.00	.9974
Model summary	$F(6, 95) = 2.05, p = .0663, R^2 = .11$			
Model 3				
Food Responsiveness	.55	.23	2.43	.0170
Authoritarian	-.25	.47	-.54	.5871
Indulgent	-.09	.49	-.18	.8570
Uninvolved	-.46	.53	-.87	.3870
Authoritarian X Food Responsiveness	-.10	.47	-.20	.8400
Model summary	$F(6, 95) = 2.09, p = .0653, R^2 = .12$			

Note. All analyses controlled for maternal BMI score. Referent group for feeding style was authoritative.

Table 8

*Summary of multiple regression analyses predicting child BMIz from food enjoyment, mothers' feeding style, and the interaction between food enjoyment and feeding style*

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Model 1				
Food Enjoyment	.59	.22	2.65	.0094
Authoritarian	.01	.45	.02	.9807
Indulgent	-.35	.49	-.70	.4828
Uninvolved	-.50	.53	-.94	.3511
Uninvolved X Food Enjoyment	.05	.52	.11	.9162
Model summary	$F(6, 97) = 2.23, p = .0464, R^2 = .12$			
Model 2				
Food Enjoyment	.61	.22	2.74	.0073
Authoritarian	.00	.45	-.01	.9944
Indulgent	-.43	.50	-.86	.3916
Uninvolved	-.44	.52	-.86	.3943
Indulgent X Food Enjoyment	.40	.55	.71	.4765
Model summary	$F(6, 97) = 2.33, p = .0385, R^2 = .13$			
Model 3				
Food Enjoyment	.59	.23	2.61	.0106
Authoritarian	-.01	.47	-.01	.9915
Indulgent	-.36	.49	-.73	.4658
Uninvolved	-.49	.52	-.95	.3467
Authoritarian X Food Enjoyment	-.07	.49	-.14	.8921
Model summary	$F(6, 97) = 2.23, p = .0463, R^2 = .12$			

Note. All analyses controlled for maternal BMI score. Referent group for feeding style was authoritative.

Table 9

*Summary of multiple regression analyses predicting child BMIz from satiety responsiveness, mothers' feeding style, and the interaction between satiety responsiveness and feeding style*

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Model 1				
Satiety Responsiveness	-.77	.33	-2.35	.0207
Authoritarian	.06	.56	.13	.9008
Indulgent	-.15	.49	-.31	.7582
Uninvolved	-.39	.55	-.71	.4791
Uninvolved X Satiety Responsiveness	.14	.81	.17	.8649
Model summary	$F(6, 97) = 1.94, p = .0812, R^2 = .11$			
Model 2				
Satiety Responsiveness	-.78	.33	-2.34	.0212
Authoritarian	.05	.46	.10	.9194
Indulgent	-.16	.49	-.32	.7501
Uninvolved	-.41	.52	-.79	.4321
Indulgent X Satiety Responsiveness	-.18	.85	-.21	.8356
Model summary	$F(6, 97) = 1.95, p = .0807, R^2 = .11$			
Model 3				
Satiety Responsiveness	-.77	.33	-2.35	.0210
Authoritarian	.02	.47	.05	.9625
Indulgent	-.15	.49	-.32	.7510
Uninvolved	-.45	.52	-.85	.3948
Authoritarian X Satiety Responsiveness	.25	.68	.36	.7177
Model summary	$F(6, 97) = 1.96, p = .0782, R^2 = .11$			

Note. All analyses controlled for maternal BMI score. Referent group for feeding style was authoritative.

Finally, as noted previously, a significant interaction was found with respect to fussiness (Table 10). Specifically, the overall model testing the interaction between uninvolved feeding style and fussiness was significant  $F(6, 97) = 2.57, p = .0237$  and accounted for 14.0% of variance in child BMIz. Although a significant main effect of fussiness was found (unstandardized coefficient =  $-.48, p = .0148$ ), there was a significant interaction between uninvolved feeding style and fussiness in the prediction of

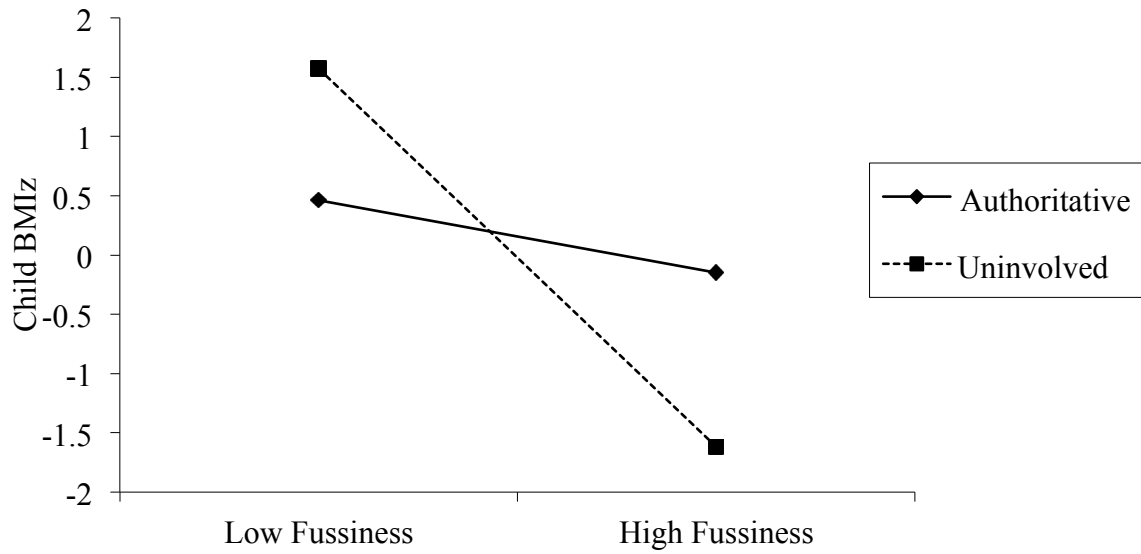
child BMIz (unstandardized coefficient = -1.10,  $p = .0447$ ). This interaction is depicted graphically in Figure 3. A significant negative association between fussiness and child BMIz was found, but only among children of mothers with an uninvolved feeding style ( $b = -1.37, p = .0074$ ).

Table 10

*Summary of multiple regression analyses predicting child BMIz from fussiness, mothers' feeding style, and the interaction between fussiness and feeding style*

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Model 1				
Fussiness	-.48	.20	-2.48	.0148
Authoritarian	.02	.45	.04	.9654
Indulgent	-.25	.49	-.52	.6056
Uninvolved	-.27	.50	-.53	.5969
Uninvolved X Fussiness	-1.10	.54	-2.03	.0447
Model summary	$F(6, 97) = 2.57, p = .0237, R^2 = .14$			
Model 2				
Fussiness	-.44	.20	-2.21	.0293
Authoritarian	.10	.46	.22	.8257
Indulgent	-.28	.52	-.53	.5976
Uninvolved	-.23	.51	-.46	.6489
Indulgent X Fussiness	.20	.42	.4708	.6389
Model summary	$F(6, 97) = 1.84, p = .0985, R^2 = .10$			
Model 3				
Fussiness	-.42	.20	-2.12	.0367
Authoritarian	-.04	.47	-.08	.9355
Indulgent	-.44	.50	-.87	.3850
Uninvolved	-.24	.51	-.48	.6355
Authoritarian X Fussiness	.43	.41	1.04	.2998
Model summary	$F(6, 97) = 2.00, p = .0724, R^2 = .11$			

Note. All analyses controlled for maternal BMI score. Referent group for feeding style was authoritative.



*Figure 3.* Relation between fussiness, uninvolved feeding style, and child BMI. There is a significant negative association between fussiness and child BMIz but only among children of mothers with an uninvolved feeding style ( $b = -1.37, p = .0074$ ). In other words, higher levels of fussiness are associated with lower child BMI in the presence of uninvolved maternal feeding style.

Table 11

*Summary of multiple regression analyses predicting child BMIz from desire to drink, mothers' feeding style, and the interaction between desire to drink and feeding style*

	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>
Model 1				
Desire to Drink	.00	.16	-.01	.9957
Authoritarian	-.09	.46	-.19	.8478
Indulgent	-.04	.50	-.09	.9324
Uninvolved	-.16	.52	-.31	.7575
Uninvolved X Desire to Drink	-.50	.38	-1.31	.1940
Model summary	$F(6, 97) = 1.27, p = .2787, R^2 = .07$			
Model 2				
Desire to Drink	.01	.16	.04	.9678
Authoritarian	-.07	.47	-.14	.8883
Indulgent	-.01	.52	-.02	.9857
Uninvolved	-.19	.52	-.37	.7124
Indulgent X Desire to Drink	.27	.36	.74	.4588
Model summary	$F(6, 97) = 1.06, p = .3890, R^2 = .06$			
Model 3				
Desire to Drink	.00	.16	.02	.9804
Authoritarian	-.14	.47	-.30	.7682
Indulgent	-.17	.51	-.33	.7445
Uninvolved	-.20	.52	-.38	.7032
Authoritarian X Desire to Drink	.30	.32	.96	.3394
Model summary	$F(6, 97) = 1.13, p = .3508, R^2 = .07$			

Note. All analyses controlled for maternal BMI score. Referent group for feeding style was authoritative.



## CHAPTER VIII

### DISCUSSION OF RESULTS

Childhood obesity represents a serious public health concern in the United States. Along with child eating behaviors, parent feeding styles represent a potentially important influence on the development of obesity during early childhood. Compared with the large literature on specific feeding practices, much less is known about feeding styles. This study was designed to address this research gap and had three objectives. The first objective was to examine the prevalence and correlates of different feeding styles in a sample of mother-child dyads in a rural southern population. Most previous research examining feeding styles has focused on urban, low-income, and/or ethnically diverse families due to these groups being at high risk for obesity. Although the researcher's sample was relatively homogenous and consisted primarily of well-educated and middle class Caucasian mother-child dyads, this group is also at elevated risk for obesity by virtue of geography. Specifically, although obesity is a common concern across the United States, the highest rates are observed in southern regions and Mississippi ranks first among all U.S. states in childhood obesity. Thus, examination of parent feeding styles in this population represents a unique contribution to the literature and extends previous studies on this topic by furthering current knowledge of feeding styles with another group at-risk for childhood obesity.

#### Prevalence and Correlates of Maternal Feeding Style

In the current sample, the prevalence of each feeding style closely parallels the distribution of feeding styles found in previous studies that focused on parents of preschoolers in urban (Hughes et al., 2005), rural (Hennessy et al., 2012; Hughes et al.,

2008), and ethnically diverse populations (Hennessy et al., 2010, Hughes et al., 2011; Tovar et al., 2012). Previous research on feeding styles has indicated that approximately 33% of mothers have an authoritarian style, 33% have an indulgent style, 17% have an authoritative style, and 17% have an uninvolved style (Hughes et al., 2012). A very similar distribution was found in the current study sample. The similarity between the feeding style distributions found in low-income urban samples and the distribution found in the current sample, which has a high level of educational attainment and income level, suggests that the distribution of parent feeding styles may be relatively invariable across groups or may vary as a function of other factors beyond socio-demographics.

Contrary to our hypotheses, no relationships were found between feeding style and maternal socio-demographic variables, including age, race/ethnicity, marital status, and income. Although it was hypothesized that African American mothers would be more likely to have an uninvolved feeding style, results indicated no association between feeding style and race/ethnicity; however, this finding should be interpreted cautiously due to the underrepresentation of racial and ethnic minorities in our sample. It may be that the inability to conduct subgroup analyses in the current sample due to small subgroup sizes restricts the potential to detect meaningful group differences with respect to race/ethnicity and feeding style. Alternatively, the lack of racial/ethnic group differences in feeding style may be attributed to the higher SES of our sample. Previous research showing that African American mothers are more likely to show an uninvolved feeding style was conducted in a low-income sample of mothers. Poverty can have a significant impact on approaches to child feeding, as factors such as depressive symptoms and lower self-esteem related to restricted financial resources may also be

associated with the low level of involvement seen in the uninvolved feeding style (Hughes et al., 2005). Although it is possible that race and income may interact in the prediction of feeding style, with low-income African Americans being most likely to be classified as uninvolved, existing studies have not tested for differences in feeding styles among African American mothers across income levels. Additional research is needed to disentangle the effects of income and race on feeding style.

It was also predicted that mothers with lower levels of educational attainment would be more likely to have an authoritarian or indulgent feeding style. However, no significant relationships between feeding style and education level were detected. Although no published studies have examined the association between maternal education and feeding style, previous research on general parenting style related to the four typologies described by Baumrind (1971) has found an association between lower levels of education and an authoritarian or indulgent parenting style (Dornbusch, Ritter, Leiderman, Roberts, & Fraleigh, 1987). One possible explanation for this lack of association is that while education level may influence general parenting techniques, this does not extend to the food environment. Alternatively, it could be that small sample size and lack of variability in the current sample with respect to educational attainment precluded the detection of associations between feeding style and education level.

Contrary to the hypothesis that mothers with a higher weight status would be more likely to have an authoritarian or indulgent feeding style, no associations between maternal BMI and feeding style were found. Previous findings on the relationship between maternal BMI and feeding strategies have been mixed, with some finding an association between maternal overweight status and lower levels of control over child

eating (Orrell-Valente et al., 2007; Robinson et al., 2001) and others finding no association (Wardle, Sanderson, Guthrie, Rapoport, & Plomin, 2002). No known studies have examined the relationship between maternal BMI and specific feeding styles. Additional research may be necessary to determine whether there is an association between maternal weight status and feeding style.

Our results suggest that there are gender differences in maternal feeding style. Specifically, mothers are more likely to demonstrate an authoritarian feeding style with boys and an indulgent feeding style with girls. Very little research on parent feeding style has examined gender-based group differences for parent feeding style. Findings on the differential use of parent feeding practices by gender has shown mixed findings, with some suggesting higher parental use of restriction with daughters (Costanzo & Woody, 1985) and others finding higher use of restriction with sons (Fisher & Birch, 1999). However, previous research has shown that parents often adapt their feeding strategies based on multiple factors, including child gender (Matton, Goossens, Braet, & Van Durme, 2012), child health factors (Carnell et al., 2011), age, temperament, and weight status (Johannsen, Johannsen, & Specker, 2006), as well as parental characteristics including parent weight status (Francis, Hofer Scott, & Birch, 2001; Shunk & Birch, 2004), cultural food practices (Evans et al., 2011), and concern with child overweight (Webber, Hill, Cooke, Carnell, & Wardle, 2010).

#### Associations between Feeding Style and Child Eating Behaviors

The second objective of this study was to determine whether children of mothers within each of the feeding style groups differ with respect to their eating behaviors. In the current study we examined child eating behaviors more broadly than most previous

research, including both positive and negative appetitive traits. This is an important contribution to the literature, as little previous research has specifically examined the association between parent feeding style and child eating behaviors. Findings of studies examining parent feeding practices suggest that high levels of maternal control in feeding (Birch, Fisher, & Davison, 2003; Jansen et al., 2012) and permissive feeding practices (Rodgers et al., 2013) are associated with children being less responsiveness to hunger and satiety cues and being more likely to exhibit emotional eating. Frankel et al. (2014) found that an indulgent feeding style was associated with eating behaviors demonstrating poor self-regulatory abilities (i.e., high enjoyment of food and low satiety responsiveness). Consequently, it was hypothesized that children of mothers classified as authoritarian in their feeding style (i.e., mothers who typically exhibit high levels of control and low levels of responsiveness in feeding) as well as children of mothers classified as indulgent (i.e., permissive in feeding interactions) would have lower levels of satiety responsiveness and higher levels of emotional eating compared with children of mothers classified as authoritative or uninvolved. Our results partially support this hypothesis. Although children of mothers in the authoritarian feeding style group had the highest level of emotional overeating, the only significant group difference was observed between the authoritarian group and the indulgent group. Children in the authoritarian and indulgent groups were not rated by their mothers as exhibiting more emotional overeating than children in the authoritative or uninvolved groups. This pattern of findings indicates that the authoritarian and indulgent groups represent opposite extremes with respect to the constructs of demandingness and responsiveness and are, thus, more different from one another than they are from the other classifications.

Our hypothesis related to feeding style and satiety responsiveness was also only partially supported. Although authoritarian and indulgent feeding practices have been linked with low satiety responsiveness in children, in the current study children of mothers with an authoritarian feeding style were rated as having the highest levels of satiety responsiveness, with no difference in levels of child satiety responsiveness between authoritarian and authoritative mothers. However, children of mothers classified as indulgent and uninvolved in their feeding style were rated as showing less satiety responsiveness than children of authoritarian mothers. One possible explanation for this finding is that parents' laissez faire approach to feeding results in healthy choices and optimal eating patterns being superseded by children's own specific food preferences (Hughes et al., 2005; Hughes et al, 2008; Olvera & Power, 2010). In other words, when parents are more permissive in their feeding, children are more likely to select and consume sweet foods and/or high fat, high salt foods. Available evidence supports this conclusion. Indulgent feeding style is associated with higher consumption of low nutrient dense foods (Hennessy et al., 2012; Hoerr et al., 2009) and greater intake of sweetened beverages, fats, and oils (Hoerr et al., 2009), and research suggests that highly palatable foods such as these are more likely to be consumed beyond satiety (Blundell & King, 2008). Alternatively, it is also possible that this finding is due to reporter bias. As measured in the current study, satiety responsiveness reflects the degree to which an individual ceases eating or chooses not to initiate eating based on his or her perceived fullness. It may be that mothers with a highly demanding authoritarian feeding style may perceive their child as having high satiety responsiveness, when in fact what they are observing that their child is highly responsive to parental cues regarding whether to

continue or stop eating. Future research using observations of parent and child mealtime behaviors rather than parent reports would help to shed light on this issue.

In addition to having higher scores on emotional overeating, results also showed that mothers with an authoritarian feeding style rated their children as demonstrating more emotional undereating compared with children of mothers with an uninvolved feeding style. One possible explanation for this association is that authoritarian parents, by exerting high levels of control without compensatory responsive behaviors, create a highly stressful food environment that leads to emotional eating. Parent-child interactions during mealtimes can be highly negative and stressful for children when their caregiver adopts an authoritarian feeding style, and indeed, higher levels of parent negative affect and intrusiveness during feeding interactions have been observed among authoritarian mothers (Hughes et al., 2011). A strong association between stress and emotional eating beginning in preschool has been reported (Michels et al., 2012), with emotional undereating and overeating both linked to emotional distress in toddlers and preschoolers (Wardle, Guthrie, Sanderson, & Rapoport, 2001a). Wardle and Gibson (2002) showed that persistent and uncontrollable stressors, which may be characteristic of the general feeding climate shaped by parents with an authoritarian feeding style, were linked to undereating behaviors. In other words, preschoolers exposed to an authoritarian feeding style may cope with the stressful eating climate created by their mothers by not eating when they experience negative emotions. Alternately, this finding may be indicative of the presence of response bias. Mothers with an authoritarian feeding style may be more aware of their child's eating patterns than those with an uninvolved style, who may have less knowledge of their child's eating behaviors and appetitive responses to stress.

It is noteworthy that these results did not support an association between an authoritarian feeding style and food responsiveness in children. This contrasts with some previous research finding a strong association between parental restriction and food responsiveness in toddlers and preschoolers (Jansen et al., 2012; Rodgers et al., 2013). However, prior studies have examined this relationship in samples of older children, and research shows that food responsiveness may increase with age (Wardle et al., 2001a). In young children, food responsiveness may be more related to factors such as temperament than to parent feeding practices or styles. Illustratively, research suggests that eating behaviors in young children are related to a constellation of factors, including temperament. One study showed that in children ages 2 to 5 child temperament traits including irritability were significant predictors of child enjoyment of food (Bergmeier, Skouteris, Horwood, Hooley, & Richardson, 2014). Research also shows a relationship between child temperament and parent feeding, with child stubbornness and emotionality associated with overreactive parenting strategies and the use of more parent-centered feeding practices (Vereecken Rovner, & Maes, 2010). Temperament also impacts child eating behaviors, with Wardle, Carnell, and Cook (2005) showing that both controlling parental feeding strategies and a difficult child temperament were associated with lower fruit and vegetable consumption in 2 to 6 year-olds. It is possible that for younger children, temperament guides eating behaviors more than parent feeding practices but becomes comparatively less influential during the preschool years and into middle childhood.

Finally, children of indulgent mothers had significantly lower levels of fussiness compared to children of mothers with authoritative and authoritarian feeding styles. Food



fussiness is characterized mainly by child rejection of foods that they dislike or are unfamiliar with (Dovey, Staples, Gibson, & Halford, 2008). Because mothers with an indulgent feeding style show high levels of responsiveness to child food preferences, it may be that children of indulgent mothers show lower levels of food fussiness because they are provided with preferred food items. Mothers may therefore see less evidence of picky eating and would rate their children as lower in fussiness. Future research using direct observations of mealtime interactions between mothers and their children to determine the impact of maternal responsiveness on child fussiness would help to elucidate this finding.

#### Feeding Style, Child Eating Behaviors, and Child BMI

Contrary to the author's hypothesis as well as what has been found in some previous studies, the results suggest that maternal feeding style is not related to preschoolers' BMI. Previous research suggests a link between both authoritarian and indulgent feeding styles and higher child weight status (Hennessy et al., 2010; Hughes et al., 2005; Hughes et al., 2008; Hughes et al., 2009) and an authoritative feeding style and lower child weight status (Berge et al., 2010; Hubbs-Tait et al., 2013). The majority of research examining the relationship between child weight and parent feeding style has focused on low-income populations. It may be that this association is less robust in a sample that has a higher level of education and household income. It is also possible our sample differed with respect to other variables that may be influential with respect to children's weight, such as level of nutritional knowledge. Illustratively, women with higher educational level and socioeconomic status have been found to have a higher knowledge of dietary recommendations, healthy food choices, nutrients, and diet-disease

links (Parmenter, Waller, & Wardle, 1999). High maternal nutrition knowledge has also been linked to increased child fruit and fiber intake (Gibson, Wardle, & Watts, 1998) and lower fat intake (Variyam, Blaylock, Lin, Ralston, & Smallwood, 1999). Additional studies examining whether maternal nutritional knowledge serves as a moderator of the association between parent feeding style and child weight could help address this possibility. Alternately, it may be that the reliance on maternal self-report of child weight status for a subgroup of participants ( $n = 49$ ) resulted in inaccurate child BMI data, which obscured findings. Research suggests that mothers are more likely to underestimate their children's weight than overestimate it (Lundahl, Kidwell, & Nelson, 2014); thus, children whose mothers reported their weight may in reality have higher BMI values than what was used for analyses.

An examination of the relationship between child eating behaviors and child weight status showed that children with higher levels of food responsiveness and food enjoyment also had higher BMIs. This is consistent with previous research linking positive appetitive eating patterns and higher weight status (Frankel et al., 2014; Webber et al., 2009). One explanation for this association is that these patterns of increased appetite and high responsivity to food lead to increased food consumption, resulting in weight gain. Consistent with previous literature, children with lower satiety responsiveness had higher BMIs (Hoerr et al., 2009; Hughes et al., 2005; Hughes et al., 2008). Because children with higher satiety responsiveness are more able to quickly detect their perceived level of fullness, it may be these children are more capable of regulating their food intake and avoiding the tendency to overeat.

Although it was hypothesized that children with higher levels of desire to drink would have a higher weight status, no relationship between desire to drink and child BMIz was found. Previous research examining the relationship between higher desire to drink and weight status suggests that this association may be specific to the desire to drink high caloric beverages that lead to excess weight gain (Webber et al., 2009). Alternatively, high desire to drink may be linked to child BMI as a consequence of higher intake of unhealthy foods containing high quantities of sodium (Webber et al., 2009). No data on dietary intake were collected, restricting the ability to interpret the lack of significant findings through consideration of dietary factors such as intake of specific nutrients.

A unique contribution of this study was its exploration of the interactions between child eating behaviors and parent feeding styles in relation to their effect on child BMI. It was found that children with high levels of both emotional undereating and emotional overeating were more likely to have a higher BMI, but only in the presence of an uninvolved parent feeding style. Hughes et al. (2005) found that mothers with an uninvolved feeding style have significantly lower levels of nurturance, organization, and consistency in discipline and are less likely to create a food environment that is structured and supportive. Drawing on these findings, one possible explanation for the moderating role of uninvolved feeding in the relationship between child emotional eating and BMI is that children of mothers with an uninvolved feeding style live in home environments that make emotional eating more risky with respect to the potential for excessive weight gain due to increased availability and accessibility of high energy, low nutrient dense foods. Hoerr et al. (2009) showed that children of parents with an uninvolved feeding style had

the most energy-dense diets compared with children of parents with other feeding styles, and also consumed lower levels of fruits, vegetables, and dairy products. Consequently, it may be that children of uninvolved mothers are actually consuming more calories than children of mothers with other feeding styles, even though our data suggest they actually engaged in less emotional overeating and undereating than other children. Moreover, uninvolved parent feeding style may put children at risk for sedentary behaviors and inadequate physical activity levels, further shifting their energy balance in the direction of weight gain. Although no studies to date have specifically investigated characteristics of the home environment that are associated with an uninvolved feeding style, home environments that are unstructured and unsupportive (i.e., low levels of nurturance) have been associated with obesogenic practices such as children watching television during mealtimes (Boutelle, Birnbaum, Lytle, Murray, & Story, 2003; Tremblay & Rinaldi, 2010). Children of mothers with a general parenting style characterized by lack of involvement have also been found less likely to be physically active compared with children of parents with more involved parenting styles (Hennessy et al., 2010). Future research examining emotional eating in relation to child weight outcomes should consider effects of uninvolved feeding style on children's dietary intake and physical activity levels.

A significant interaction was also found for fussiness, with higher levels of fussy child eating behavior associated with lower child BMI, but only in the presence of an uninvolved feeding style. Specifically, fussiness in children of uninvolved mothers may lead to lower child BMI because uninvolved mothers do not respond to their children's fussiness by engaging in controlling feeding practices that have been associated with

higher weight in children. Thus, although research suggests that higher levels of fussiness in children are associated with greater parental pressure to eat (Haycraft & Blissett, 2012; Powell, Farrow, & Meyer, 2011), this relationship may depend on parent feeding style. Illustratively, in the context of other feeding styles, child fussiness may result in parents being more likely to attempt to promote child eating by using controlling feeding practices such as demands (e.g., “Clean your plate”) or positive strategies, such as modeling and providing a mixture of new and unfamiliar foods. It is also possible that uninvolved mothers do not respond to child fussiness by trying to encourage eating because they are less aware and/or concerned about their children’s weight. Some support for this speculation is provided by Gregory, Paxton, and Brozovic (2010), who found that the relationship between controlling feeding practices and fussy eating was partially mediated by parental concern for child underweight. Overall, considering that mothers with an uninvolved feeding style are characterized by low levels of involvement and control over the food environment, they may be less aware of fussy child eating behaviors, have lower levels of concern for child underweight, and be less likely to adapt their feeding strategy in response to potentially maladaptive child eating behaviors. The lack of compensatory feeding strategies may result in lower child food consumption, leading to a calorie deficit and lower child weight status. Future research should examine stylistic differences in parent feeding tactics in response to child fussiness and weight status to further elucidate the mechanisms involved in this relationship.

### Limitations and Future Directions

Some limitations of the current study should be discussed. First, the sample size is relatively small ( $N = 128$ ) and homogenous, limiting the ability to examine more nuanced between-group differences for key variables of interest such as race/ethnicity, level of educational attainment, and household income. Although the shift in focus in the current sample from low-income minority populations to a higher income Caucasian sample that is at elevated risk for childhood obesity due to high rates of parental overweight/obesity and their region of residence provides a unique contribution to the research base, the lack of diversity also limits generalizability of results. It is unknown whether the interactions between feeding style, child eating, and child weight status found in the current study vary as a function of race/ethnicity, SES, or geographical factors.

This study also relied on mother-reported data of feeding style and child eating behaviors. Mothers may have intentionally or unintentionally reported inaccurate data. For example, mothers who are not involved in their child's food environment could not be expected to be fully aware of their own feeding practices or their child's eating behaviors. It is also possible that mothers intentionally altered their responses in an attempt to be more socially or culturally acceptable, thereby providing a false view of their actual feeding beliefs and practices. The use of mothers' estimates of child height and weight to determine child BMI<sub>z</sub> for a portion of the sample is another limitation. In the current study, the author attempted to overcome this limitation by asking mothers to weigh and/or measure their child before participating in the study. Previous research has shown that the accuracy of mothers' estimations of their children's weight may be influenced by factors such as ethnicity, child age, and parent/child weight status (Jackson,

Strauss, Lee, & Hunter, 1990). The lowest accuracy rates in maternal estimation of child weight status are associated with low maternal education (Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000), maternal overweight status, and child overweight status (Doolen, Alpert, & Miller, 2009). Mothers have also been shown to overestimate their daughters' weight more than their sons' weight (Maynard, Galuska, Blanck, & Serdula, 2003), and parents often overestimate overweight among young children and underestimate overweight in older children (Akinbami & Ogden, 2009). Relatedly, some mothers whose children were not present to be weighed and measured also failed to report their child's estimated height and weight, prohibiting the calculation of BMI<sub>z</sub> for those children. This resulted in a lower sample size and a reduced power to find effects between key variables and child weight status.

The cross-sectional design of the study also limits interpretations of our study findings. Although results show an association between parent feeding styles, child eating behaviors, and child weight at one point in time, no causal conclusions of these findings can be drawn. The data collected reflect mothers' perspectives of their own feeding style and child's eating behaviors at a single point in time. Previous research has shown that parents adapt their feeding behaviors depending on external factors such as their child's temperamental traits and weight status (Faith et al., 2004; Horn, Galloway, Webb, & Gagnon, 2011). Although feeding styles have been shown to be relatively stable over time (Darling & Steinberg, 1993), the lack of longitudinal data inhibits the ability to know whether mothers' reports of their feeding practices reflect the normative patterns of feeding used with their child.

Strengths of this study include the use of more global parent feeding style typologies rather than specific parent feeding practices within the food environment and the broad examination of child eating behaviors. It also extends the current literature by examining potential mechanisms by which parent feeding styles and child eating behaviors interact to influence child weight status. Our findings contribute to the growing research base on the importance of parent feeding style by highlighting the potential moderating role of parent feeding style in the association between child eating behaviors and child BMI.

In conclusion, findings from the current study add to the small but growing literature investigating parent feeding style. It is recommended that future studies on this topic utilize longitudinal research designs to further our understanding of how the relations between parent feeding styles and child eating behaviors evolve over time to impact child weight and obesity risk. It is likely that the parent-child eating/feeding relationship is transactional and changes over the course of development. Use of observational methodology in naturalistic settings such as the home environment is also recommended, as it would enhance our understanding of the associations among parent feeding styles and child eating behaviors by overcoming limitations related to reporter bias.



## APPENDIX A

### RECRUITMENT MATERIALS

The following pages show the front and back sides of the recruitment postcard that were distributed at local preschools and daycares.

In addition, we posted a recruitment flyer around at locations around USM and Hattiesburg.





## APPENDIX B

### INFORMED CONSENT FORM

#### THE UNIVERSITY OF SOUTHERN MISSISSIPPI AUTHORIZATION TO PARTICIPATE IN RESEARCH PROJECT

Consent is hereby given to participate in the study titled: Mississippi Mothers of Preschoolers Project

#### **Purpose**

Obesity is a common condition that affects even very young children. There are many different views on childhood obesity and child weight, and we are interested in learning how mothers' opinions and experiences are related to the ways they approach feeding their preschool-aged children. We are also interested learning about how mothers' unique experiences may change the relationship between their views about obesity and their child feeding styles.

#### **Description of Study**

This study involves collecting information from mothers who have children between the ages of 3 and 5 years. If you agree to participate, you will be weighed and your height will be measured in your street clothes (without shoes) by a trained research assistant. After being weighed and measured, you will do a brief computer task. You will then be provided with a stack of cards with pictures of different size bodies on them and ask to select the one that best represents your body size and shape. Finally, you will be asked to complete several questionnaires that will ask about parenting, your child's eating behaviors, and your beliefs about what causes people to be overweight.

#### **Benefits**

In appreciation of your time, after you complete the questionnaires you will receive a Walmart gift card valued at \$20.00.

#### **Risks**

There is little risk to you associated with participation in this study. People who are self-conscious or embarrassed about their size may be nervous about being weighed. While completing the parent questionnaires, you will be asked questions related to your child's eating habits and your parenting style. These questions are not meant to be overly personal or intrusive, and there are no right or wrong answers. However, if you become uncomfortable, you can skip any questions that you do not wish to answer.

### **Confidentiality**

Confidentiality will be maintained within the limits allowed by law. You will be given an identification number to ensure the complete confidentiality of your responses. Participant information (your name) and the data you provide on questionnaires will be kept separately in locked secure locations and will be accessible only by the trained study staff. All computer files with identifying information will be kept in password protected secure computer files. Data will be used only for research purposes. Your name and personal information will be used only for logistic purposes (maintaining gift card logs) after you have completed the study questionnaires. Your name will not appear in any report, paper, or presentation to ensure your privacy and confidentiality.

### **Participant's Assurance**

Whereas no assurance can be made concerning the results that may be obtained (since results from investigational studies cannot be predicted) the researcher will take every precaution consistent with best scientific practice. Participation in this study is completely voluntary, and participants may withdraw from this study at any time without penalty, prejudice, or loss of benefits. Questions concerning the research should be directed to Dr. Natalie Williams at (601) 266-6745. This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research participant should be directed to the Chair of the Institutional review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406-0001, (601) 266-6820. You will be provided with a copy of this form.

### **Signature**

I have read or have had read to me the description of the research study as outlined above. My signature below indicates that I freely volunteer to participate in the study. I understand that I do not have to take part in this study, and that my refusal to participate will involve no penalty or loss of rights to which I am entitled. I further understand that I am free to later withdraw my consent and discontinue participation in this study at any time.

---

Signature of Participant

---

Date

---

Signature of Principal Investigator

---

Date

## APPENDIX C

## INSTITUTIONAL REVIEW BOARD NOTICE OF COMMITTEE ACTION



THE UNIVERSITY OF  
SOUTHERN MISSISSIPPI

## INSTITUTIONAL REVIEW BOARD

118 College Drive #5147 | Hattiesburg, MS 39406-0001

Phone: 601.266.6820 | Fax: 601.266.4377 | [www.usm.edu/irb](http://www.usm.edu/irb)

## NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Institutional Review Board in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months.  
Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **C12101602**

PROJECT TITLE: **Mississippi Mothers of Preschoolers Project**

PROJECT TYPE: **Previously Approved Project**

RESEARCHER(S): **Natilie Williams**

COLLEGE/DIVISION: **College of Education & Psychology**

DEPARTMENT: **Psychology**

FUNDING AGENCY/SPONSOR: **N/A**

IRB COMMITTEE ACTION: **Expedited Review Approval**

PERIOD OF APPROVAL: **06/27/2013 to 06/26/2014**

**Lawrence A. Hosman, Ph.D.**

**Institutional Review Board**



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