

EFFECTS OF MATERNAL DEPRESSION, MATERNAL  
TEMPERAMENT, AND PARENTING ON CHILD  
OVERWEIGHT AND OBESITY

By

ERIN SESEMANN

Bachelor of Science in Psychology

Oklahoma Christian University

Edmond, Oklahoma

2013

Submitted to the Faculty of the  
Graduate College of the  
Oklahoma State University  
in partial fulfillment of  
the requirements for  
the Degree of  
MASTER OF SCIENCE  
December, 2015

EFFECTS OF MATERNAL DEPRESSSION,  
MATERNAL TEMPERAMENT, AND PARENTING ON  
CHILD OVERWEIGHT AND OBESITY

Thesis Approved:

Glade Topham, Ph.D.

---

Thesis Adviser

Amanda Harrist, Ph.D.

---

Isaac Washburn, Ph.D.

---

Name: ERIN SESEMANN

Date of Degree: DECEMBER, 2015

Title of Study: EFFECTS OF MATERNAL DEPRESSION, MATERNAL TEMPERAMENT,  
AND PARENTING ON CHILD OVERWEIGHT AND OBESITY

Major Field: HUMAN DEVELOPMENT AND FAMILY SCIENCE

Abstract: Overweight and obesity have a large impact on the social, emotional, and physical functioning of children. Previous literature has connected parental depression and parenting style to higher child body mass index (BMI); however, prior literature has not examined the link between parental temperament and child BMI. This study sought to expand the literature by examining this association. Furthermore, this study investigated whether parenting styles and parenting behaviors mediated the relations between maternal depression, maternal temperament, and child BMI, pathways not yet examined in prior research. As part of the larger Families and Schools for Health (FiSH) project, 107 third grade children (42.1% female;  $M = 6.93$ ) were followed longitudinally through their fourth grade year. Mothers completed the Center for Epidemiologic Studies Depression Scale (CES-D), Adult Temperament Questionnaire (ATQ), Parenting Styles and Dimensions Questionnaire (PSDQ), and Coping with Children's Negative Emotion Scale (CCNES) when children were in third grade. Child BMI was assessed when children were in fourth grade. The hypothesized mediation was not supported; however, confidence intervals skewed to one side of zero suggest significance might be found with greater power. Maternal depression and maternal temperament were significantly correlated with parenting styles and parenting behaviors. These correlations add to the relatively sparse literature connecting maternal temperament to parenting. Clinical implications are discussed and recommendations for future research are presented.

*Keywords:* maternal depression, maternal temperament, parenting styles, parenting, child overweight, child obesity

## TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION .....	1
Intervening in Childhood Overweight and Obesity.....	2
II. REVIEW OF LITERATURE.....	5
Theoretical Foundation.....	5
Family Stress Perspective.....	5
Maternal Intrapersonal Variables .....	9
Interpersonal Contexts.....	16
Maternal Intrapersonal Variables and Interpersonal Contexts .....	19
The Current Study .....	22
III. METHODOLOGY .....	24
Participants and Procedures.....	24
Measures.....	28
Data Analysis .....	31

Chapter	Page
IV. RESULTS .....	34
Correlational Analyses .....	34
Mediation Analyses .....	35
V. DISCUSSION .....	39
Summary of Results .....	39
Interpretation of Results .....	39
Tests of Mediation .....	40
Maternal Intrapersonal Variables to Child Weight Problems (Pathway <i>c</i> ) .....	41
Maternal Intrapersonal Variables to Interpersonal Contexts (Pathway <i>a</i> ) .....	43
Interpersonal Contexts to Child Weight Problems (Pathway <i>b</i> ) .....	44
Child BMI Outcome Variable Type .....	46
Clinical Implications .....	47
Limitations and Future Research .....	47
Conclusion .....	50
REFERENCES .....	51
APPENDICES .....	61

## LIST OF TABLES

Table	Page
1 .....	27
2 .....	33
3 .....	36
4 .....	37
5 .....	37
6 .....	37
7 .....	38
8 .....	38

## LIST OF FIGURES

Figure	Page
1 .....	61
2 .....	62
3 .....	63

## CHAPTER I

### INTRODUCTION

The Centers for Disease Control and Prevention (CDC) recognizes childhood obesity as a serious problem in the United States (2015). Between the ages of two and 19 approximately 17% of children and adolescents are obese (Centers for Disease Control and Prevention, 2015). Overweight or obese children have lower quality physical functioning, mental functioning, and social functioning, termed health-related quality of life, when compared to non-overweight children (Tsiros, 2009; Ul-Haq, Mackay, Fenwick, & Pell, 2013). Children who are overweight or obese are not only more likely to have concurrent low self-esteem (Taylor, Wilson, Slater, & Mohr, 2012), but being overweight or obese also predicts low self-esteem across time. Hesketh, Wake, and Waters (2004) found that being overweight or obese between the ages of five and ten was predictive of lower levels of self-esteem when measured three years later. As children's weight increases their attitudes toward physical activity, their beliefs in their abilities to be physically active, and their body image tend to become less favorable (Kolody & Sallis, 1995; Tsiros, 2009). An increase in weight from overweight to obese may additionally diminish health-related quality of life. When children are already overweight, additional weight gain tends to negatively impact them even more (Ul-Haq, Mackay, Fenwick, & Pell, 2013). When health-related quality of life for both obese and overweight children is compared to non-overweight children, obese children have greater reductions in their health-related quality of life than overweight children (Ul-Haq et al.).



Childhood overweight and obesity also has long lasting effects as children move into adulthood. Current childhood overweight and obesity is a strong predictor of weight later in life (Bergmeier, Skouteris, Shorwood, Hooley, & Richardson, 2014; Leim, Buuren, Sauer, Jaspers, Stolk, & Reijneveld, 2013). Kelsey, Zaepfel, Bjornstad, and Nadeau (2014) reviewed the current available research that has examined the link between childhood obesity and adult outcomes and found that childhood obesity was associated with numerous negative physical outcomes in adulthood, such as cardiovascular disease, nonalcoholic fatty liver disease, breast cancer, endometrial cancer, and premature death. Individuals entering adulthood already obese had decreased survival rates from cancer contracted in adulthood. Furthermore, childhood body mass index (BMI) in the top fifth percentile was predictive of type-2 diabetes at the age of 39 (Kelsey et al., 2014).

### **Intervening in Childhood Overweight and Obesity**

It is evident that childhood overweight and obesity has significant negative effects on children as they move into adulthood, therefore, the next important step is determining effective pathways for intervention. Kelsey et al. (2014) hypothesized that the continuity of being overweight and obese from childhood to adulthood makes a large impact on health, perhaps larger than just the presence of childhood overweight and obesity; therefore, research should investigate the factors and processes that are most effective in understanding the pathways that facilitate childhood overweight and obesity. This knowledge will be crucial when developing effective early intervention and prevention programs. Previous research has focused on various child factors influencing childhood overweight and obesity, such as child dietary habits and child emotional eating (e.g. Harrist, Hubbs-Tait, Topham, Shriver, & Page, 2013; Webber, Hill, Saxon, Van Jaarsveld, & Wardle, 2009); however, to maximize intervention effects it is important to intervene through multiple avenues in children's lives.

One such avenue that is essential in shaping children's trajectories is the parent-child relationship (Holden, 2010). When mothers establish poorer relationships with their children,

often characterized by lack of involvement and less scaffolding, children have more negative outcomes, such as increased complaining, yelling, and difficulty with emotion regulation (Feng, Shaw, Skuban, & Lane, 2007; Hoffman, Crnic, & Baker, 2006). Two main mechanisms through which parents may influence children are parenting styles and parenting behaviors. An authoritative parenting style fosters the best outcomes in children while authoritarian, permissive, and neglectful parenting styles often contribute to negative child outcomes, such as nicotine and alcohol consumption, more sedentary leisure activities, and poorer nutrition (Vollmer & Mobley, 2013). Authoritative parenting is consistently linked to positive health outcomes and lower weight levels in children (See review by Sleddens et al., 2011). In addition to parents' parenting styles, their behavioral reactions toward their children also significantly impacts children. For example, children show worse outcomes when parents punish or minimize children's emotions (Morelen & Suveg, 2012). When parents respond to their children's emotions with belittling or dismissing behaviors children are more likely to inhibit or inappropriately express their emotions. Parenting styles and parenting behaviors may also facilitate children's obesogenic lifestyles. Mothers with a tendency to be overinvolved during mealtimes are linked with negative feeding behaviors, including spoon-feeding, verbal encouragement to eat, disapproving, or scolding. On the other hand, mothers who tend to be neglectful during mealtimes show minimal involvement while eating with their children (Hughes et al., 2011). An inappropriate parental involvement or lack of parental involvement increases the chances that children will be more impulsive and less regulated when interacting with food (Braungart-Rieker, Moore, Planalp, & Lefever, 2014).

In addition to parenting behaviors, parent intrapersonal variables, such as personality, self-regulation, and mental-health have also been shown to predict a host of child outcomes, such as child emotion regulation, general psychopathology, and self-esteem (Bariola, Hughes, & Gullone, 2012; Bridgett, Burt, Laake, & Oddi, 2013; Maughan, Cicchetti, Toth, & Rogosch, 2007; Morris, Silk, Steinberg, Myers, & Robinson, 2007; Taylor et al., 2012). Two specific parent variables that are particularly important in predicting child outcomes are maternal depression and

maternal temperament (Atzaba-Poria, Deater-Deckard, & Bell, 2014; Goulding et al, 2014). Children of depressed mothers show more negative outcomes than children of non-depressed mothers, such as increased emotion dysregulation (Hoffman et al., 2006). Children of depressed mothers are less able to regulate their emotions in order to meet the demands of their context. In fact, teachers report that children of depressed mothers show more internalizing behaviors, such as sadness and worry, than children of non-depressed mothers (Jung, Raikes, & Chazan-Cohen, 2013). Children of depressed mothers also show negative outcomes that are specific to health and weight. They are more likely to be overweight and obese, have unhealthy eating patterns, and engage in more sedentary activities with less physical activity (Durate, Shen, & Must, 2012; Gross, Velazco, Briggs, & Racine, 2013; Lampard, Franckle, & Davision, 2014). Similarly, children of mothers with more negative temperaments show increased internalizing problems (Mills et al., 2012). In response to distress, children of mothers with negative temperaments tend to be less effective at coping and more likely to show symptoms of depression or anxiety than children of non-depressed mothers. Although the link between maternal depression and child outcomes is well established (Cimino, Cerniglia, & Paciello, 2014), the literature on maternal temperament and child outcomes is still relatively small and more research is needed (Atzaba-Poria et al., 2014; Bridgett et al., 2013). Based on the negative outcomes seen in children when mothers have high negative emotionality or poor effortful control, such as dysregulated emotions and more behavioral problems (Derryberry & Rothbart, 1988; Hooper, Feng, Christian, & Slesnick, 2015), maternal temperament is expected to significantly impact child health and weight. In addition, little is known about relations among maternal depression, maternal temperament, general parenting, and child overweight/obesity. The relations among these variables are crucial to understand because they influence the interpersonal interactions between parents and children that are essential when intervening and shaping children's life trajectories (Holden, 2010).

## CHAPTER II

### REVIEW OF THE LITERATURE

#### **Theoretical Foundation**

Mothers' intrapersonal variables have an important influence on family dynamics and have been linked to a wide range of effects on children. Children's emotion regulation, externalizing behaviors, internalizing behaviors, and mental health are impacted by maternal variables such as self-regulation and depression (Bridgett et al., 2013; Cimino et al., 2014; Goodman et al., 2011). Family dynamics are impacted as well. Family cohesion, nurturance and warmth are influenced by maternal personality and psychopathology (Prinzle, 2009; McConley et al., 2011). Harrist et al. pointed out, however, that the pathway that "translates" family dynamics into child outcomes, such as obesity, is less clear than the fact that there are significant associations between family dynamics and childhood obesity (2012, p. 448). In this paper, one specific pathway that may "translate" maternal intrapersonal variables to child outcomes will be examined. In the next section I describe how the relations among maternal temperament, maternal depression, and childhood overweight/obesity can be understood from the family stress and family risk perspectives.

#### **Family Stress Perspective**

Pathways from mother depression and mother temperament to childhood overweight and

obesity can be examined from family stress and family risk perspectives. Family stress perspectives take into account the stressors and resources of families to identify families who are most likely to be at risk (Patterson, 2002). Malia (2006) defined stressors as triggering events that range from major societal events to daily hassles, strains, and life events. Patterson (2002) stated that stressors could be 1) normative or nonnormative stressors, 2) on-going family strains (unresolved, insidious tensions), or 3) daily hassles (p. 350). Whether the stressors are large or small, it is important to note that stressors can pileup and contribute to negative outcomes when there are not enough resources to cope with stressors. Resources are internal strengths of the family that allow it to keep transitions and situations that come up from turning into crises or disruptions (McCubbin & Patterson, 1983). Family resources may be tangible things a family has, such as stable employment and finances, or family resources may also be dynamics of the family, in other words, what the family does. Family warmth, support, flexibility, predictability, structure, and meaning making are family dynamics that are commonly identified as resources (Walsh, 2012). Patterson (2002) identified that stressors and resources arise from three levels: individual, family, and communities. Harrist et al. (2012) created a psychosocial risk model of intrapersonal and interpersonal variables impacting childhood obesity that is helpful when conceptualizing the various pathways between the levels. (See Figure 1 in appendices for full Harrist et al. model.) Previously, this model included the relations among interpersonal contexts, intrapersonal child mediators, and child weight problems. I propose expanding the model to also examine the relations between maternal intrapersonal variables and interpersonal context because intervening at the maternal level may be an effective route of intervention for childhood overweight and obesity. (See Figure 2 for an expanded Harrist et al. model and Figure 3 for the model that is specific to this study.) As this study is focused on how maternal intrapersonal resources influence child outcomes, the individual and family levels will be the focus.

### **Individual Level Variables**

Maternal intrapersonal traits, such as personality, are included as individual stressors and resources (McCubbin & Patterson, 1983); however, it is unclear how responsive personality traits are to intervention. Another option is to target aspects of mothers that are responsive to intervention (Harrist et al., 2012), such as depression (Goulding et al., 2014) and temperament (Rothbart, 2004).

**Depression and family risk.** The presence of depression may serve as a stressor and therefore increase families' risk for childhood overweight and obesity through its effects on mothers' interactions with their children. Mothers with depression are characterized by less positivity toward their children, less attunement and responsiveness to children, more hostile parenting, and feelings of apathy while parenting (Feng et al., 2007; Goodman et al., 1994; Hoffman et al., 2006; Lei, Zhang, Cai, Bai, & Zhu, 2014). These parenting behaviors could contribute to the negative interpersonal contexts identified by Harrist et al. (2012), which have already been significantly linked to child intrapersonal mediators and child weight outcomes, such as obesogenic child lifestyle habits and childhood overweight and obesity (Harrist et al., 2012). Negative interpersonal contexts include obesogenic family food and lifestyle patterns and the presence of more negative family dynamics while child intrapersonal processes include poor self-regulation, poor self-awareness, and the presence of more negative affect. The symptoms of depression may put mothers at a higher risk to foster negative interpersonal contexts and promote maladaptive processes in their children.

**Temperament and family risk.** Temperament is the automatic physiological reaction that occurs with emotions that differentiate people's reactivity, excitability, and self-regulation (Derryberry & Rothbart, 1988; Goldsmith et al. 1987). Particularly, two sub-constructs of temperament, negative emotionality and effortful control, are of particular importance when considering intervention. Negative emotionality is demonstrated when people automatically respond to situations with negative emotions, such as fear, frustration, sadness, and discomfort. Effortful control is the ability to organize the self, direct attention, motivate actions, and inhibit

actions (Evans & Rothbart, 2007). Negative emotionality and poor effortful control may increase families' risk for childhood overweight and obesity because they make it more difficult for mothers to create healthy interpersonal contexts with their children, such as flexibility, warmth, and support (Walsh, 2012). When considering negative emotionality, mothers with higher levels of negative emotionality display more negative affect and use more controlling parenting tactics than mothers with positive emotionality (Atzaba-Poria, Deater-Deckard, & Bell, 2014). This type of parenting style could put families more at risk for childhood overweight and obesity because the parenting is lacking warmth and support that is needed to help children develop healthy weight and healthy relationships with food and physical activity. Maternal effortful control may serve as either a stressor or resource for families. Poor effortful control has been linked to numerous negative outcomes for families, such as home chaos and parenting stress (Bridgett et al, 2013; Oddi et al., 2013)

**Family level resources.** In addition to mothers' individual resources, this study will also examine family resources that are responsive to intervention, particularly parenting styles and parenting behaviors. Harrist et al. (2012) highlighted the fact that there is less research dedicated to understanding how interpersonal family interactions affect children's weight. Maternal temperament and depression are two important maternal intrapersonal variables that could be important in predicting the interpersonal family contexts shown to play a role in the development of childhood overweight and obesity. Depression, higher negative emotionality, and poorer effortful control may create greater risk for negative interpersonal contexts, such as family obesogenic lifestyle patterns or negative family dynamics. Mothers with more depressive symptoms are less supportive of their children (Conners-Burrow et al, 2014) while mothers with higher rates of negative emotionality tend to use more controlling behaviors (Atzaba-Poria et al., 2014). Poor effortful control may decrease mothers' abilities to create consistent daily patterns for their children (Bridgett et al.; Oddi et al., 2013). Higher levels of depressive symptoms (Coyne, Low, Miller, Seifer, & Diskstein, 2007) and negative emotionality (Atzaba- Poria et al.) are

associated with mothers displaying more negative affect while poorer effortful control is associated with mothers using harsher tones and more physical force with their children (Atzaba-Poria et al). It could be that the presence of maternal depression, high levels of negative emotionality, and poor effortful control increase the demands and stress that is placed on family systems. If families do not have enough resources to combat the demands, then families are more vulnerable to maladaptation and imbalance. The imbalance of resources and stressors may increase families' vulnerability to risk and contribute to the development and maintenance of childhood overweight and obesity.

### **Maternal Intrapersonal Variables**

The interpersonal and intrapersonal model that Harrist et al (2012) created includes child intrapersonal variables but does not include maternal intrapersonal variables. The model can be expanded to include maternal intrapersonal variables as they may have a significant influence on families. (See Figure 2 in appendices for the proposed expanded model.) The addition of maternal intrapersonal variables could strengthen the model by providing an explanation for the variables that are predictive of the negative interpersonal contexts.

### **Maternal Depression and Child Outcomes**

Depression, defined as an affective disorder that “is characterized by alterations in emotional functioning, including depressed mood and anhedonia” (Ehring, Fischer, Schnulle, Bosterling, & Tuschen-Caffier, 2008, p. 563) has a significant impact on families and children (Jung et al., 2013). Families have an increased risk of family conflict when maternal depression is present in the family system (Oyserman, Mowbray, Allen Meares, & Firminger, 2000) and families that report higher levels of maternal depression are more likely to report lower levels of parenting quality, family cohesion, and maternal nurturance (McConley et al, 2011). Children of mothers with depression experience more negative emotions, including anger, sadness, and fear, and less positive emotions, such as happiness or cheerfulness (Goodman et al., 2011). They also show increased frequency of externalizing behaviors. Children of depressed mothers are less able



to control their anger, show higher levels of aggression, and are more likely to be diagnosed with conduct and oppositional defiant disorders (Goodman et al., 2011; Cimino et al., 2014).

Furthermore, they show more internalizing behaviors, such as depression, guilt, worry, and sadness (Cimino et al., 2014; Coyne & Thompson, 2011; Jung et al., 2013). Later in life, children of depressed mothers are more likely to display symptoms of other psychiatric disorders, including depression and anxiety (Goodman et al., 2011; Oyserman et al., 2000).

### **Maternal Depression and Child Health Outcomes**

In addition to general outcomes, maternal depression also significantly impacts children's weight and their relationships with eating and physical activity. Duarte, Shen, and Must (2012) found that maternal depression negatively affected children across time. Children of mothers with high depressive symptomology tend to have higher BMI, have less healthy eating habits, and engage in less physical movement than children of mothers with no depressive symptomology (Fernald, Jones-Smith, Ozer, Neufeld, & Girolamo, 2008; Gross et al., 2013; Lampard et al., 2014).

**Child weight.** Maternal depression has been linked to childhood overweight and obesity. Gross et al. (2013) showed that mothers with moderate to severe depressive symptomology were more likely to have overweight or obese five-year-old children (Lampard et al., 2014). Mothers who reported increased depressive symptoms had children who showed significantly higher BMI scores. When looking at BMI across time, Duarte et al. (2012) found significant associations between severe maternal depression and BMI scores for children when examining child BMI and maternal depression in kindergarten, third grade, and fifth grade. For boys, if mothers showed severe depression symptoms in kindergarten they had significantly higher BMI scores in fifth grade than boys of non-depressed mothers. For girls, if mothers reported severe depression in third grade, they had higher BMI scores in fifth grade compared to girls of non-severely depressed mothers. Similarly, children from mothers in the top third distribution of depression display higher BMI percentiles and are more likely to be categorized as obese (McConley et al.,

2011). Wang et al. (2013) found additional interesting results regarding the relations with maternal depression and child BMI across time as well. Maternal depression was measured when children were 1 month, 24 months, and 36 months while child BMI was measured at first grade, third grade, and sixth grade. The significant associations across time were examined through correlations as well as the frequencies depression across time. When looking at correlations, the presence of maternal depressive symptoms when children were one month and 24 months was predictive of higher child BMI in sixth grade. Additionally, when children were 36 months, the presence of maternal depression was predictive of higher BMI in third grade. Regarding the frequency of depressive symptoms, children were more likely to be overweight in sixth grade when their mothers reported depressive symptoms at two time points compared to mothers without any depressive symptomology. Child of mothers who reported depressive symptoms at three time points were more likely to be overweight in first grade, third grade, and sixth grade. Children were still more likely to be overweight when their mothers had reported depressive symptoms at two or three even after controlling for child and mother characteristics, such as children's birth weight, children's gender, children's ages, maternal education level, maternal social support, and breast feeding (Wang et al., 2013).

**Obesogenic lifestyle patterns.** Given that depressed mothers may be stuck in negative affect, be less responsive, are less supportive (Connors-Burrow et al., 2014) and have lower parenting self-efficacy, depressed mothers may be less active and involved in the dietary habits of their children than non-depressed mothers (Feng et al., 2007; Oyserman et al., 2000). With increased freedom, children may grow up having fewer rules and expectations surrounding their caloric intake. Children of depressed mothers are less likely to eat at the kitchen table and more likely to watch television while eating (Goulding et al, 2014). Gross et al., (2013) found that children of mothers with increased depressive symptomology were less likely to eat breakfast, more likely to consume sugary drinks, and more likely to eat out for meals. Less involvement would allow children to choose foods based on taste and convenience rather than nutrition as well

as allow them to have full control over the amount of food consumption. In fact, Goulding et al. found that mothers with elevated depression symptoms were less likely to eat meals with their children; thus, they were less likely to model healthy eating. Duarte et al. (2012) found that, for boys, unhealthy eating mediated the relationship between maternal depression and high levels of BMI. For girls, however, there were split findings (Duarte et al.). When mothers reported severe depression symptomology when children were in kindergarten, girls had lower BMI scores in third grade compared to girls of non-depressed mothers; however, if mothers reported severe maternal depression when girls were in third grade, the girls had higher BMI scores in fifth grade than girls of non-depressed mothers. Duarte et al. hypothesized this finding reflected the development of the ability to self-feed. From kindergarten to third grade, mothers may carry the majority of responsibility of providing meals and, therefore, children may not get fed due to the debilitating nature of depression. Then, children's BMI may increase as they mature because they have more control over their own feeding practices and require less help from their mothers to eat. Duarte et al.'s findings supported their hypothesis as third grade girls with severely depressed mothers ended up surpassing the BMI levels of girls with non-depressed mothers by fifth grade.

Physical activity is also impacted by maternal depressive symptoms, like fatigue and inactivity, which may spillover from mothers to children's physical activity levels (Gross et al., 2013). In fact, children of mothers showing high levels of depressive symptomology have significantly lower activity levels than children of non-depressed mothers (Fernald et al., 2008). This may be problematic as less recreational activities are linked with higher levels of BMI (McConley et al., 2011). Mothers with increased depressive symptomology have children who have lower average times playing outdoors (Gross et al.). Durate et al. (2012) found that decreased physical activity and increased time watching TV or videos mediated the significant association between severe maternal depression and increased BMI in girls. Children of depressed mothers may be at a greater risk for unhealthy levels of BMI because they are spending less time physically burning calories, they are establishing fewer healthy habits, and spending

more time being inactive. Furthermore, these effects may be long lasting. In a longitudinal study, Fernald et al. found that maternal depression continued to be a risk factor when children were aged 4 to 5 if it was present when children were 15 months old, regardless of mothers' current level of depression.

### **Maternal Temperament and Child Outcomes**

According to Rothbart, temperament is the automatic biologically- based process of reactivity, excitability, and self-regulation that shapes intrapersonal and interpersonal reactions (Goldsmith et al, 1987). The study of temperament is typically conducted with children while adult literature has primarily focused on personality (Achtergarde et al., 2015; Prinzie, 2009). Recently, however, researchers have begun to tease apart temperament and personality within adults and explore adult temperament effects (Atzaba-Poria et al., 2014; Evans & Rothbart, 2007; Evans & Rothbart, 2009). Mothers' temperaments have been found to significantly impact families and children (Chen, Deater-Deckard, & Bell, 2014). Two aspects of temperament that have been previously linked with negative outcomes are maternal negative emotionality, when mothers have automatic negative emotional reactions, and maternal self-regulation, the ability to organize and direct the self (Derryberry & Rothbart, 1988).

**High negative emotionality.** The effects of mothers' negative emotionality can be seen within the family system and among individual children. Mothers who show higher levels of negative emotionality have also been shown to have higher levels of automatic physiological reactivity (Bridgett et al., 2013). This suggests that mothers with more negative temperaments are quicker to react, which may make it more difficult to engage in effective parenting practices since less time elapses between emotions and behaviors. Oddi et al. (2013) found that maternal positive emotionality was negatively related to parenting stress and feelings of isolation in the parenting role. These mothers may experience more stress and feel alone during parenting, therefore, are more likely to foster the interpersonal contexts listed by Harrist et al (2012) if they do not have adequate resources to combat these stressor. The interpersonal contexts listed by Harrist et al.

included poor feeding climates, high levels of control or disengagement, disallowance of negative emotion, and difficulty managing conflict. Maternal negative emotionality carries over to influence children as well. It has been linked to child maladjustment including child conduct problems, emotional problems, and hyperactivity/inattention. Hooper et al. (2015) found that children of mothers with higher negative emotionality were more emotionally reactive, showed higher levels of withdrawal tendencies, and had more aggressive behavioral problems than children of mothers with more positive emotionality.

**Poor self-regulation.** In addition to negative emotionality, another important aspect of temperament is self-regulation, termed effortful control (Evans & Rothbart, 2007). Mothers with higher levels of self-regulation may have less stress and more personal resources available to cope with stressors, which could influence more positive outcomes. This is seen in other relationship dynamics as better self-regulated mothers have higher relationship satisfaction and more agreement with their intimate partners (Bridgett et al., 2013). Furthermore, families of mothers with better effortful control have less chaos in the home, possibly from being better organized, having more consistent routines, and having less noisy atmospheres than mothers with lower levels of effortful control (Bridgett et al.). Oddi et al. (2013) observed that higher levels of maternal effortful control had a direct and significant relation with lower levels of parenting stress. Mothers with more ability to control their actions and direct their attention may be more capable at effectively dealing with parenting stressors and therefore report less stress. Consequently, more positive results may indicate that better effortful control puts less stress on the system and/or could serve as a valuable resource when combatting stressors.

In addition to seeing high levels of effortful control as a resource, in other words, being linked to less home chaos and better relationship satisfaction and agreement, low levels of effortful control may be considered a stressor: when mothers have poorer effortful control more negative outcomes have been found for their children. Children tend to show more behavioral problems when mothers have lower levels of effortful control (Derryberry & Rothbart, 1988).

Bridgett et al. (2013) found that mothers with less ability to control their attention and automatic reactions had infants with more negative emotionality, such as higher levels of distress and frustrations, more sadness, and lower reactivity when exposed to sensations of falling. The negative associations are mediated by home environment and mothers' relationship adjustment, which suggests that mother's effortful control impacts a wide range of factors in the household and children may be impacted by various combinations of the factors. For example, when parents had less control over their reactivity and became overreactive to children, their children showed more externalizing problems; however, Lipscomb et al. (2012) found this to be a significant indirect relation with child negative emotionality as the mediator between parental overreactivity and child externalizing problems. When parents had lower levels of self-regulation, only children with higher levels of negative emotionality were more prone to behaviorally act out. It could be that low levels of maternal effortful control increase the risk of families' stressors turning into negative outcomes, crises, or disruptions. More needs to be understood about the unique relations among maternal effortful control, family factors, and child outcomes.

### **Maternal Temperament and Child Health Outcomes**

While the literature base for maternal temperament and parenting behaviors is growing, additional research is needed to examine how maternal temperament affects child health and weight. Maternal depression, however, has already been consistently related to child health and weight. The associations between maternal depression and child health and weight can be used to better understand the possible relation between maternal temperament and child health and weight because of recent findings that suggest a significant relation between depression and temperament (Vasey et al., 2013; Vasey et al., 2014).

**Depression and temperament.** Vasey and colleagues (2013; 2014) found that higher negative emotionality, low positive emotionality, and poorer effortful control had various interactions that were significantly associated with concurrent depressive symptoms and predictive of future depressive symptoms (2013; 2014). Furthermore, Hudson, Harding, and

Mezulis (2015) found that the significant positive associations between adult negative emotionality and adult depressive symptoms were fully mediated by brooding and dampening. Brooding entails continuing to engage and focus upon negative thoughts, emotions, or events without making efforts to change, problem solve, or alleviate distress. Dampening is defined as decreasing the potency of positive events by redirecting attention or distracting oneself away from the emotions. Given this pathway between negative emotionality, effortful control, and depression, it follows that maternal depression can be used to postulate about maternal temperament. Mothers with more negative emotionality and poorer effortful control may support unhealthy lifestyles for their children through their parenting behaviors, such as how they interact with their children during mealtimes and how they structure their children's relationship with food and physical activity.

### **Interpersonal Contexts**

Interpersonal contexts within families are often studied through parenting (Dix, 1991). Goulding et al. (2014) hypothesized that the core symptoms of depression contribute to unhealthy child outcomes through their impact on parenting behaviors (Braungart-Rieker, Moore, Planalp, & Lefever, 2014). Depressed mothers are more likely to report engaging in negative parenting practices, including neglect, psychological aggression, and physical assault of their children (Turnery, 2011). Adult temperament literature supports that hypothesis with its own consistent significant negative associations between negative affect and the ability to control, direct, or inhibit actions (Evans & Rothbart, 2007; Evans & Rothbart, 2009). Adults who demonstrate higher levels of negative affect also show less control over the motivational and attentional systems (Atzaba-Poria et al.). Hughes and Shewchuk (2012) hypothesized that the presence of negative affect becomes an "impediment" in parenting because it impairs cognitive, social, and goal-directed functioning (p. 7). To better understand parenting the literature has looked at both parenting styles and parenting behaviors.

### **Parenting Styles and Child Outcomes**

Categories of parenting styles have been identified based on warmth/responsiveness and control/demandingness (Baumrind, 1991). Parents who are high on control/demandingness and low on warmth/responsiveness are categorized as *authoritarian*. These parents set strict rules with the expectation that children will not question or challenge the rules. Authoritarian parenting is significantly linked with punishing and dismissing parent responses to children's negative emotion (Topham et al., 2009). In contrast, *authoritative* parents are high on control/demandingness and high on warmth/responsiveness. This parenting style is significantly negatively correlated with punishing and dismissing parent responses to children's negative emotions (Topham et al., 2009). Authoritative parents set rules and have expectations but also foster a warm and responsive relationship with their children through respecting and engaging in discussions with their children. Authoritative parenting is positively correlated with parental affective responsiveness and involvement (Topham et al., 2011). This indicates that authoritative parents are more emotionally expressive, more affectionate, and are more likely to reach out. *Permissive* parents are identified by low control/demandingness and high warmth/responsiveness and are often seen setting few rules or little structure in the household while being very responsive and giving to children's needs. A fourth style, *neglectful*, is characterized by low control/demandingness and low warmth/responsiveness. These parents are uninvolved and display little to no affection to their children. Topham et al. (2011) found that authoritarian and permissive parenting were both significantly and positively correlated with being punitive or dismissive to children's negative emotions. Children of authoritarian and neglectful parents show the most negative outcomes, such as higher levels of nicotine and alcohol consumption, more sedentary leisure activities, and poorer nutrition (Vollmer & Mobley, 2013).

### **Parenting Styles and Child Health Outcomes**

Parenting styles that are low on control/demandingness and/or low warmth/responsiveness may negatively impact childhood overweight and obesity. A meta-analysis by Pinquart (2014) examined the connection between general (i.e., non-food related)



parenting and child weight and found that parental overprotection and psychological control were associated with higher child body weight (Vollmer & Mobley, 2013). Overprotection and psychological control parallel the characteristics of authoritarian parenting, that is, high on demand and control but low on warmth while utilizing few explanations during parenting. This style of parenting could impair children's abilities to be self-aware and self-regulate. Non-reasoning punitive responses, that are characteristic of authoritarian parenting, are significantly related to more child emotional eating (Topham et al. 2011). Furthermore, Topham et al. (2009) found that permissive parenting was connected to childhood overweight and obesity when moderated by depression and high socioeconomic status. This suggests that low amounts of control and demandingness when structuring and setting household expectations may create indulgent climates that are not conducive to children learning self-regulation or self-awareness. This could also be seen from neglectful parenting as well since children are often left to manage their own schedules and lifestyles. In fact, previous longitudinal literature has connected neglectful parenting with higher weight and less healthy eating in children (Vollmer & Mobley, 2013). Authoritative parenting, however, has been consistently linked to positive health outcomes and lower weight levels (Sleddens et al., 2011). Families with authoritative parents engage in more family meals and eat less fast food (Vollmer & Mobley, 2013). Vollmer and Mobley reported that children of authoritative parents eat more fruits and vegetables and less sugars and fats. They also weigh less and engage in more physical activity (Pinquart, 2014; Vollmer & Mobley, 2013).

### **Parenting Behaviors and Child Outcomes**

The way that parents respond to their children's negative emotions also has a significant role in shaping children's subsequent thoughts, feeling, and behaviors (Morelen & Suveg, 2012). One process through which children learn to internally regulate and become self-aware is through observing their parents' responses (Holden, 2010; Spinrad et al., 1999). Problems arise when parents' responses to children create maladaptive regulation processes or inhibit children from

developing self-awareness (Morris et al., 2007). This can occur when parents respond by punishing or dismissing children's emotional states. Punitive responses from parents are those that punish children for feeling negative emotions, while minimizing responses dismiss or reject children's emotional experiences. Parental punitive and minimizing responses have been linked with negative child outcomes, such as maladaptive emotion regulation. Children of parents who belittle, ignore, or make their children uncomfortable for discussing emotions are more likely to inhibit emotional expression or engage in derogatory or rude emotional expression (Morelen & Suveg). Higher levels of emotional understanding and emotional competence are seen in children from families that accept displays of emotion (Morris et al., 2007).

### **Parenting Behaviors and Child Health Outcomes**

Parenting behaviors also impacts children's thoughts, emotions, and behaviors regarding weight and health. Topham et al. (2011) found that child emotional eating was significantly negatively correlated with family affective responsiveness. This suggests that children are more likely to use food to cope with their distressing emotions when parents show little or no affection or positive emotion. Additionally, children are also more likely to cope by eating when their parents minimize children's negative emotional experiences (Topham et al. 2011). Warm, supportive, and responsive parenting, however, are believed to serve as protective mechanisms or resources for children in distress because they are less likely to turn to food when they experience negative emotions. This idea was supported by Pinquart's (2014) meta-analysis which found that parental responsiveness was associated with lower weight in children and more physical activity.

### **Maternal Intrapersonal Variables and Interpersonal Contexts**

Goulding et al. (2014) hypothesized that the core symptoms of depression contribute to unhealthy child outcomes through their impact on parenting behavior (Braungart-Rieker et al., 2014). The symptoms of depression, such as negative affect, hopelessness, anhedonia, and apathy, may spillover to affect parenting styles and parent behaviors. Since temperament is the automatic biologically-based processes of reactivity, excitability, and self-regulation (Goldsmith

et al, 1987), it follows that mothers' parenting styles and parenting behaviors would be impacted by their own temperaments.

### **Maternal Depression and Interpersonal Contexts**

Mothers with high depressive symptomology describe their own and their children's emotions as more negative and are less aware of the impact that their negative emotions have on their children than mothers without depressive symptoms (Coyne et al., 2007; Oyserman et al., 2000). Mothers with high levels of negative affect have been found to engage in more negative parenting behaviors, such as using physical control, harsher tones, rejection, and frowning (Atzaba-Poria et al., 2015). As a result, mothers with higher depressive symptomology could be at a higher risk for adopting an authoritarian parenting style or responding punitively while their children experience negative emotions. The presence of depressive symptomology may also put mothers at risk for permissive or neglectful parenting styles and dismissive responding. Mothers with elevated depressive symptoms are more likely to present themselves as having less authority over their children's behavior and depressive symptoms were significantly related with more acceptance of threatening or stressful life events (Lei et al., 2014). It was hypothesized that this acceptance represents the acknowledgement of negative states rather than an active process of self-affirmation. Such an apathetic or passive stance could lead mothers to have low control/demandingness that characterize permissive or neglectful parenting styles and/or to be dismissive of children's emotions.

Additionally, Connors-Burrow et al. (2014) showed that low levels of depression negatively impacted children's learning environments at home as a result of mothers being less supportive to their children. When compared to non-depressed mothers, mothers with low levels of depression were less supportive to their children's needs when preparing their children for school. Mothers with low levels of depression were significantly more likely to provide less stimulating materials for their children, spend less time reading, allow more inappropriate television, and foster less academically stimulating environments to their children (Connors-

Burrow et al.). As authoritarian and neglectful parents are identified by their low warmth/support that is needed to foster positive child outcomes (Baumrind, 1991), mothers with depressive symptoms may be at risk for being categorized as having an authoritarian or neglectful parenting style as a result of a lack of appropriate parental support. Furthermore, mothers with depressive symptoms consider mutual relationships with their children as less important than mothers without any depressive symptomology (Oyserman et al., 2000); therefore, it could be that they have tendencies toward authoritarian parenting, neglectful parenting, or nonsupportive parenting because of specific parenting behaviors and/or because they hold negative mindsets toward their children that motivates less effective parenting behaviors.

### **Maternal Temperament**

While the temperament and parenting literature is still relatively small (Atzaba-Poria et al., 2014; Bridgett et al., 2013), a few key findings suggest more research is needed to better understand how maternal temperament contributes to parenting styles and parenting behaviors.

**Negative emotionality.** Mothers with higher levels of negative emotionality indicate higher levels of fear, frustration/anger, sadness, or discomfort (Evans & Rothbart, 2007). These automatic emotional experiences may shape how they react and behave toward their children while parenting. Atzaba-Poria et al. (2014) found significant positive associations between maternal negative emotionality and maternal negative parenting behaviors when children had higher levels of problem behaviors. Mothers with high levels of negative emotionality displayed more negative affect, such as frowning and using harsher tones, and used more negative controlling behaviors, such as using criticism or physical force to direct the child (Atzaba-Poria et al.). This suggests that mothers with higher levels of negative emotionality have more trouble responding appropriately to stressful parenting situations and may be more likely to be categorized in a non-authoritative parenting style.

**Effortful control.** Mothers' effortful control impacts their parenting styles and parenting behaviors as well. Lower levels of maternal effortful control predict more negative parenting

behaviors, such as rejection, frowning, using a harsh tone, and using physical control (Atzaba-Poria et al., 2015). Bridgett et al. (2013) discussed how lower levels of effortful control may put mothers at risk for having more difficulties when trying to be attuned to their children and meet their children's unmet needs because of the inability to intentionally direct and focus their own attention. These attentional and regulation difficulties could make it problematic for mothers to engage in authoritative style parenting practices, such as being warm and structured during distressing interactions with their children. An increased ability to manage reactivity and self-regulate would allow mothers to be more effective at managing stress or negative emotions (Bridgett, et al.; Oddi et al., 2013); thus allowing them to engage in an authoritative parenting style and respond appropriately to their children's negative emotions.

### **The Current Study**

Childhood obesity is a serious problem in the United States that needs to be addressed (Centers for Disease Control and Prevention, 2015) and this study aimed to expand the knowledge of what family and individual factors contribute to childhood overweight and obesity. In addition to family level and individual level factors, this study also aimed to increase our understanding about the pathway from parent to child. A better understanding of parental intrapersonal variables that are predictive of childhood overweight and obesity and associated parenting styles and parenting behaviors could further inform and improve treatment efforts. Recent research linking parenting behaviors and childhood overweight and obesity has informed prevention and intervention programs aimed at improving child outcomes (Harrist et al., 2013; Webber et al., 2009), therefore, the addition of parental intrapersonal variables could provide additional prevention and intervention options. A recent body of literature has shown a connection between both general parenting behaviors and child overweight/obesity and maternal depression and child overweight/obesity. Furthermore, based on the literature, maternal temperament might be an additional key variable to consider when intervening in childhood overweight and obesity. Maternal negative emotionality covers a wide range of reactivity,

including fear, frustration, sadness, discomfort, but this study focused exclusively on frustration reactivity to help understand this specific aspect of temperament. It could be that these relations actually form a pathway that affects childhood overweight and obesity with parenting style and parenting behaviors mediating the relations between 1) maternal depression and childhood overweight/obesity; and 2) maternal temperament and childhood overweight/obesity. This study is one of the first to study these variables in this way, so, while parent-child relationships are dyadic and complex, it is beyond the scope of this study to examine the reciprocal effects of children influencing parents. As a result, child covariates were not included in the analyses. Given the reviewed literature the following hypotheses were tested. Hypothesis 1 states that maternal depression, frustration reactivity, and poor effortful control will be positively related to child BMI. Hypothesis 2 states that permissive and authoritarian parenting and negative response to child emotion will be positively related to child BMI. Hypothesis 3 states that parenting style and parental response to child emotion will partially mediate any associations between maternal depression, maternal frustration reactivity, maternal activation control, maternal attentional control, maternal inhibitory control, and child BMI.

## CHAPTER III

### METHODOLOGY

#### **Participants and Procedures**

Data for this study were collected through the Families & School for Health (FiSH) Project (Harrist et al., 2012) funded by the United States Department of Agriculture. This was a longitudinal project with 2 cohorts totaling 1171 children. Children from 29 rural elementary schools from a Midwestern U.S. state participated in the study. Data collection began during the fall (2005 for Cohort I and 2006 for Cohort II; Wave 1) and spring (Wave 2) of children's 1<sup>st</sup> grade year. Subsequent interviews were conducted each spring during their 2<sup>nd</sup> (Wave 3), 3<sup>rd</sup> (Wave 4), and 4<sup>th</sup> (Wave 5) grade years. Child data were available for: 1165 children for Wave 1, 1130 children for Wave 2, 944 children for Wave 3, 783 children for Wave 4, and 623 children for Wave 5. For the purposes of this study data were used from Wave 4 for mothers and Wave 5 for children. Mother data were available for: 450 mothers in Wave 1 and 134 for Wave 4. The FiSH Project included an obesity intervention the first year of the study (Topham et al., 2014). Any intervention effects will be statistically controlled for in the current study's analyses.

Interviews were conducted with children in the beginning and end of their first grade year (Waves 1 and 2) and during the spring of their 2<sup>nd</sup> and through 4<sup>th</sup> grade years (Waves 3-5). Parents were asked to complete questionnaire packets at each Wave. Questionnaire packets were distributed to caregivers of participating children through the mail or schools. In Wave 1 494 (42%) families returned their completed packets and in Wave 4 134 (11%) of parents returned questionnaires. Parents were modestly compensated for returning completed questionnaires. Only

maternal responses are used in this study due to the limited participation and response from fathers. Trained project research assistants (trained graduate or undergraduate students) interviewed the children in quiet, private settings on the elementary schools campus, such as in the library or hallway. Children's anthropometric assessments (height and weight) were measured during the physical education period or outside the child's classroom. The trained research assistants followed the guidelines of the WHO Multicentre Growth Reference Study Group (World Health Organization, 2004). Research assistants were trained by measuring a standard person to within 0.5 cm. They received training until results were recorded accurately. Children were asked to remove bulky clothing during assessments, including large sweater or jackets. A digital scale was used to measure children's body weight (Tanita electronic scale model BWB-800, accuracy +/- .2lb (+/-) 0.09kg); Tanita, Arlington Heights, IL, USA). Children's height was measured twice and averaged in order to conduct the analysis. A third measurement was taken if the first two measurements were not within +/-0.3cm of each other. When this occurred the discrepant measure was discarded. Before beginning data collection, the FiSH Project was approved by the University's Institutional Review Board and received verbal approval by the superintendents, written informed consent from principals, teachers, and parents, as well as assent from the children.

This study utilized a longitudinal design because it included maternal data from Wave 4 (children's 3<sup>rd</sup> grade year) and child BMI data from Wave 5 (children's 4<sup>th</sup> grade year). This study included data when it was available for both mothers and children. Demographic data for the subsample of parents used in the current study (cases having wave 4 mother data and wave 5 child data) were available for a total of 107 children and their mothers (see Table 1). The sample of children (57.9% male and 42.1% female) used in this study was comprised of 80.4% European American, 14% American Indian, 3.7% Hispanic/Latino, 0.9% African-American, and 0.9% multiracial/multiethnic. Children's age range at Wave 1 was 6.22 years to 7.97 years with a mean age of 6.93 years (SD = .37). The ethnicity distribution of children's biological mothers was



70.1% European American, 11.2% American Indian, 0.9% Hispanic/Latino, and 2.8% multiracial/multiethnic. The range of parental age was 25.13 years to 48.07 years with a mean age of 34.35 years (SD = 4.83). The majority of children's parents were in their first marriage (64.5%) with 1.9% single and never married, 6.5% single and divorced, and 12.1% remarried. The range of income per month before taxes for parents who filled out the demographics form was from \$0-100 to \$4000+ with a mean monthly income before taxes falling between \$2000-\$2499. The distribution of highest educational attainment by the parent who filled out the demographics questionnaire was 0.9% 11<sup>th</sup> grade, 4.7% 12<sup>th</sup> grade, 3.7% some vocational technical school, 22.4% some college courses, 12.1% vocational technical school graduate, and 41.1% college graduate.

Table 1

*Descriptive Statistics for Demographic Variables*

Variables	Mean (SD)	Percent	<i>n</i>
Child age in years	6.93 (.37)		10
Child Ethnicity			3
Caucasian		86	86
Native American		14	15
African American		0.9	1
Multiethnic		0.9	1
Hispanic		3.7	4
Mother age in years	34.35 (4.83)		74
Mother Ethnicity			
Caucasian		70.1	75
Native American		11.2	12
Multiethnic		2.8	3
Hispanic		0.9	1
Parent marital status			
Married, first time		64.5	69
Single, never married		1.9	2
Single, divorced		6.5	7
Remarried		12.1	13
Parent education			
11 <sup>th</sup> grade		0.9	1
12 <sup>th</sup> grade		4.7	5
Some vocational technical school		3.7	4
Some college courses		22.4	24
Vocational technical school graduate		12.1	13
College graduate		41.1	44

## Measures

### Maternal Depression

Maternal depressive symptoms was measured using the Center for Epidemiologic Studies Depression Scale (CES-D), which is a 20-item, adult self-report measure scored on a 4-point (0 = rarely or none of the time to 3 = most or all of the time) Likert-type scale that measures the degree to which participants have experienced depressive symptoms in the previous week (Radloff, 1977). The items are summed in order to calculate the participant's total score. The range of possible scores is 0 to 60 with higher scores indicating more depressive symptomology. The CES-D includes items such as "My sleep was restless," "I felt lonely," "I did not feel like eating" and "I was bothered by things that usually don't bother me." In past studies, the internal consistency was measured using Cronbach's alpha and was found to be in the acceptable range,  $\alpha = .85$ . The test-retest reliability was also found to be in the acceptable range with the range of correlations between .45 and .70 (Radloff). CES-D validity was demonstrated through discriminant validity, showing that the CES-D negatively correlated with the Bradburn Positive Affect Scale. In addition, the CES-D showed moderate correlations with other methods of measuring depression severity. The CES-D correlated with a nurse-clinician's rating of depressive symptomology severity ( $r = .56$ ) and showed positive associations with the Hamilton Clinician's Rating scale and the Raskin Rating scale (Radloff). For the current study, the inter-item reliability for depression was found to be in the acceptable range with  $\alpha = .87$ .

### Maternal Temperament

Maternal temperament was measured using the Adult Temperament Questionnaire Short-Form (ATQ; Evans & Rothbart, 2007). The ATQ Short-Form was used. This includes 77 items and is an adult self-report measure with 4 subscales: effortful control, extraversion/surgency, negative affect, and orienting sensitivity. Only the effortful control subscales and one negative affect subscale were used in this study. The measure utilizes a self-report 5-point Likert scale with 1 being "strongly disagree," 2 being "disagree," 3 being "undecided," 4 being "agree," and 5

being “strongly agree.” For each subscale, items are averaged to create the total score. The possible range for the subscales is between 1 and 5. Higher scores on the negative affect subscale indicate more frustration reactivity and higher scores on the effortful control subscale indicate better self-regulation. Items were reversed scored when necessary.

**Maternal frustration reactivity.** The negative affect scale was used to measure maternal *Frustration Reactivity*. The negative affect subscale included fear, frustration, sadness, and discomfort. The items for fear, sadness, and discomfort were removed so only the frustration items were included in this study. The scales were reduced in order to decrease the amount of time needed for parents to complete the packet. The ATQ negative affect, frustration subscale includes items such as “I rarely become annoyed when I have to wait in a slow moving line” and “I am usually a patient person.” For the current study, the inter-item reliability for *Frustration Reactivity* was found to be in the acceptable range with  $\alpha = .67$ .

**Maternal effortful control.** The effortful control subscale included *Activation Control*, *Attentional Control*, and *Inhibitory Control*. The scales were reduced in order to decrease the amount of time needed for parents to complete the packet. The items in the *Activation Control* and *Inhibitory Control* were reduced from seven to five items and the items in the attentional control were not reduced. The ATQ effortful control scale includes items such as “I am often late for appointments” and “When I am afraid of how a situation might turn out, I usually avoid dealing with it” on the *Activation Control* subscale; “It is very hard for me to focus my attention when I am distressed” and “When interrupted or distracted, I can usually easily shift my attention back to whatever I was doing before” on the *Attentional Control* subscale, and “I usually have trouble resisting my cravings for food, drink, etc.” and “I can easily resist talking out of turn, even when I’m excited or want to express an idea” on the *Inhibitory Control* subscale. Evans and Rothbart (2007) demonstrated ATQ’s validity by correlating the ATQ’s factor scales with the previously established personality measure, The Big Five Factor Model. The negative affect scale was found to highly and positively correlate with the Big Five Factor Scale neuroticism ( $r = .74$ ).

The effortful control scale was found to highly and positively correlate with the Big Five conscientiousness scale ( $r = .64$ ) and negatively correlate with neuroticism scale ( $r = -.41$ ). For the current study, the inter-item reliability (Cronbach's alphas) were found to be acceptable with *Activation Control* = .57, *Attentional Control* = .75, and *Inhibitory Control* = .59. The overall reliability for the effortful control scale was  $\alpha = .81$ .

### **Maternal Parenting Styles and Parenting Behaviors**

Maternal parenting behaviors was assessed using two assessments: The Parenting Styles and Dimensions Questionnaire (PSDQ; Robinson, Mandleco, Olsen, & Hart, 1995) and the Coping with Children's Negative Emotions Scale (CCNES; Fabes, Eisenberg, & Bernzweig, 1990).

**Parenting styles.** The PSDQ is self-report measure with 32 items. The items were scored on a 5-point scale (1 = never to 5 = always). The PSDQ's three subscales included the three parenting styles: *Authoritative* (15 questions measuring autonomy granting, reasoning/induction, warmth and support); *Authoritarian* (12 questions measuring physical coercion, non reasoning, and verbal hostility); and *Permissive* (5 questions measuring indulgence). The mean of each subscale was used to calculate each parenting style score. The PSDQ has previously been found to be reliable and valid with similar populations (Porter et al., 2005). Cronbach's  $\alpha$ s for the current sample were .89 for *Authoritative*, .79 for *Authoritarian*, and .77 for *Permissive*.

**Parenting behaviors.** The CCNES asks mothers to indicate likelihood of each of the six different response options to 12 different scenarios, with each response option representing a one of the six subscales. See Table 10 for descriptions of scenarios. The CCNES subscales are distress reactions, punitive reactions, expressive encouragement, emotion focused reactions, problem focused reactions, and minimization reactions. The two subscales of the CCNES that are of interest and are used in this study are punitive reactions and minimization reactions. The 12 items per subscale were averaged to compute each subscale's score. The punitive subscales include items such as, "I tell my child to stop crying or he/she won't be allowed to ride his/her

bike anytime soon” and the minimizing subscale included items such as, “I tell my child not to make a big deal out of missing the party.” Similar to Fabes, Eisenberg, and Bernzweig’s findings (1990), the 24 items from the punitive and minimization reaction subscales were averaged to create the negative response to child emotion subscale, termed “*Nonsupportive Responses*” (Fabes, Poulin, Eisenberg, & Madden-Derdick, 2002). Each subscale has a possible range of scores from 1-5 with lower scores indicating more negative parental responses to children emotions and higher scores indicating more positive parental responses to child emotions. Fabes, Poulin, Eisenberg, and Madden-Derdich (2002) previously established internal consistency, test-retest reliability, and construct validity for the CCNES with school-age children and parents of preschool children. Cronbach’s  $\alpha$  for the current sample was .86 for nonsupportive responding.

**Child overweight and obesity.** Childhood overweight and obesity was calculated based on BMI-for-age and sex of the participants. The Epi Info Program was used to calculate the BMI percentile by entering the child’s height, weight, sex, date of measurement, and birth date into the program (Centers for Disease Control, 2015).

### **Data Analysis**

Descriptive statistics for the study variables can be found in Table 2. In order to examine the associations among the maternal depression, maternal frustration reactivity, maternal effortful control, parenting styles, parenting behaviors, and child BMI a series of bivariate Pearson product moment correlation were conducted and a correlation matrix was constructed. Second, the data were analyzed using Hayes’ Process Macro with bootstrapping to test direct and mediation effects of maternal depression, maternal frustration reactivity, maternal effortful control, parenting style, parenting behaviors, and child BMI (Preacher & Hayes, 2008). Preacher and Hayes’ (2008) Process SPSS Macro with bootstrapping was used because it allows for a rigorous investigation of mediation.

### **Hypothesis 1**

The first hypothesis states that maternal depression, frustration reactivity, and poor effortful control will be significantly, positively related to child BMI. This hypothesis was tested using an associational design. The strength of the association was measured using bivariate Pearson product moment correlations.

### **Hypothesis 2**

The relations among parenting styles, parenting behaviors, and child BMI were examined. The second hypothesis states that permissive and authoritarian parenting and nonsupportive responses to child negative emotion will be significantly, positively related to child BMI. This hypothesis was tested using an associational design. The strength of the association was measured using a bivariate Pearson product moment correlation.

### **Hypothesis 3**

The third hypothesis states that parenting style and parent response to child negative emotion will partially mediate the association between maternal depression, maternal frustration reactivity, maternal effortful control, and child BMI. Partial mediation was tested using Preacher and Hayes' (2008) Process Marco with bootstrapping. Five mediation analyses were run, one for each independent variable: maternal depression, maternal frustration reactivity, maternal activation control, maternal inhibitory control, and maternal attentional control. All three parenting variables--authoritarian parenting style, permissive parenting style, and nonsupportive parental responses--were included in each analysis.

Table 2

*Descriptive Statistics for Variables*

Variables	<i>n</i>	Mean	SD	Minimum	Maximum	Range
Maternal Depression	95	9.35	8.95	.00	49	8.66
Maternal Frustration Reactivity	107	3.35	1.07	1.00	6.20	1.06
Maternal Activation Control	107	5.25	.92	2.20	7.00	.91
Maternal Attentional Control	107	5.03	1.06	1.00	7.00	1.06
Maternal Inhibitory Control	106	4.71	1.02	1.80	6.80	1.00
Maternal Authoritative Parenting Style	100	4.02	.50	2.47	5.00	.51
Maternal Authoritarian Parenting Style	99	1.76	.42	1.09	3.83	.44
Maternal Permissive Parenting Style	100	2.07	.67	1.00	5.00	.70
Maternal Nonsupportive Responses	99	2.10	.43	1.21	3.50	.43
Child BMI	107	67.66	27.10	.49	10.00	2.75



## CHAPTER IV

### RESULTS

#### **Correlational Analyses**

A correlation matrix was constructed to examine the bivariate correlations among all study variables. Significant correlations were found between the maternal depression, maternal temperament, parenting styles, and nonsupportive parenting. Maternal depression was significantly negatively correlated with maternal activation control ( $r = -.277, p < .01$ ) and maternal inhibitory control ( $r = -.222, p < .05$ ). Maternal depression was significantly positively correlated with authoritarian parenting style ( $r = .230, p < .05$ ). Maternal frustration reactivity was significantly negatively correlated with maternal activation control ( $r = -.349, p < .01$ ), maternal attentional control ( $r = -.449, p < .01$ ), and maternal inhibitory control ( $r = -.352, p < .01$ ). Maternal frustration reactivity was significantly positively correlated with authoritarian parenting style ( $r = .205, p < .05$ ) and permissive parenting style ( $r = .289, p < .01$ ). Maternal activation control was significantly negatively related to authoritarian parenting style ( $r = -.424, p < .01$ ) and permissive parenting style ( $r = -.437, p < .01$ ). Maternal activation control was significantly positively correlated with attentional control, ( $r = .630, p < .01$ ) and inhibitory control, ( $r = .314, p < .01$ ). Maternal attentional control was significantly negatively correlated with authoritarian parenting style ( $r = -.198, p < .05$ ) and permissive parenting style ( $r = -.369, p < .01$ ). Maternal attentional control was significantly positively related to maternal inhibitory control ( $r = .555, p < .01$ ). Maternal inhibitory control was significantly negatively correlated with permissive parenting style ( $r = -.217, p < .05$ ). Authoritative parenting style was significantly negatively

correlated with authoritarian parenting style ( $r = -.283, p < .01$ ) and nonsupportive responses ( $r = -.300, p < .01$ ). Authoritarian parenting style was significantly positively correlated with permissive parenting style ( $r = .583, p < .01$ ) and nonsupportive responses ( $r = -.227, p < .05$ ). This pattern of results suggests that maternal intrapersonal variables are significantly related to family interpersonal contexts.

Bivariate Pearson product moment correlations were used to test hypotheses 1 and 2 (see Table 3). All correlations with child BMI were nonsignificant except for maternal depression ( $r = -.226, p < .05$ ). Note that this significant finding is in the opposite direction of the expected association; therefore, these results fail to provide support for hypothesis 1 and hypothesis 2.

### **Mediation Analyses**

Process Macro with bootstrapping was used to examine for partial mediation for hypothesis 3 (Preacher & Hayes, 2008). Mediation analyses were run using model 4 and the bootstrap confidence intervals were set at 95% with the number of bootstrap resamples = 5000. All mediation analyses were nonsignificant (see Tables 4-8). Multiple confidence intervals appear to be heavily lopsided on one side of zero, including authoritarian (-.006, .022) and permissive (-.020, .004) parenting mediating the relation between maternal depression and child BMI, authoritative (-.031, .221) and permissive (-.275, .072) parenting styles mediating the relation between maternal frustration reactivity and child BMI, authoritative (-.282, .064) parenting style mediating the relation between maternal activation control and child BMI, permissive (-.075, .372) parenting style mediating the relation between maternal attentional control and child BMI, and authoritative (-.275, .038) and permissive (-.041, .318) parenting style mediating the relation between maternal inhibitory control and child BMI. This suggests that mediation for these relations may be trending toward significance. With larger sample sizes confidence intervals become smaller increasing the likelihood of significant findings. Therefore, with a larger sample size in this study, the lopsided confidence intervals may become constrained to one side of zero, indicating significant mediation.

Table 3

*Bivariate Correlations between Variables (n)*

Variables	1	2	3	4	5	6	7	8	9	10	11
1. Maternal Depression	--										
2. Maternal Frustration Reactivity	.093 (95)	--									
3. Maternal Activation Control	-.277** (95)	-.349** (107)	--								
4. Maternal Attentional Control	-.140 (95)	-.499** (107)	.630** (107)	--							
5. Maternal Inhibitory Control	-.222* (94)	-.352** (106)	.341** (106)	.555** (106)	--						
6. Effortful Control	-.258* (95)	-.468** (107)	.785** (107)	.894** (107)	.778** (106)	--					
7. Authoritative	-.146 (93)	-.130 (100)	.180 (100)	.023 (100)	.131 (99)	.131 (100)	--				
8. Authoritarian	.230* (92)	.205* (99)	-.424** (99)	-.198* (99)	-.108 (98)	-.293** (99)	-.283** (99)	--			
9. Permissive	.060 (93)	.289** (100)	-.437** (100)	-.369** (100)	-.217* (99)	-.414** (100)	-.021 (100)	.583** (99)	--		
10. Non-Supportive	.043 (94)	.058 (99)	-.129 (99)	-.049 (99)	-.153 (98)	-.131 (99)	-.300** (97)	.277* (96)	.061 (97)	--	
11. Child BMI Percentile	-.266* (95)	-.147 (107)	.084 (107)	.061 (107)	.020 (106)	.065 (107)	-.063 (99)	.007 (99)	-.114 (100)	.012 (99)	--

Note. (n) = sample size. \* $p < .05$ , \*\* $p < .01$  (two tailed)

Table 4

*Test of parenting variables as mediators of the relation between maternal depression and child BMI percentile*

Independent Variable	Mediation Variable	Indirect Effects of IV on DV through Mediator	Bootstrap (95% CI)	<i>n</i>
Maternal depression				
	Authoritative	.003	(-.006, .022)	93
	Authoritarian	.005	(-.009, .034)	92
	Permissive	-.002	(-.020, .004)	93
	Nonsupportive	.0001	(-.007, .009)	94

\* *Significant Confidence Interval*

Table 5

*Test of parenting variables as mediators of the relation between maternal frustration reactivity and child BMI percentile*

Independent Variable	Mediation Variable	Indirect Effects of IV on DV through Mediator	Bootstrap (95% CI)	<i>n</i>
Maternal frustration reactivity				
	Authoritative	.023	(-.031, .221)	100
	Authoritarian	.024	(-.076, .141)	99
	Permissive	-.052	(-.275, .072)	100
	Nonsupportive	.002	(-.040, .071)	99

\* *Significant Confidence Interval*

Table 6

*Test of parenting variables as mediators of the relation between maternal activation control and child BMI percentile*

Independent Variable	Mediation Variable	Indirect Effects of IV on DV through Mediator	Bootstrap (95% CI)	<i>n</i>
Maternal activation control				
	Authoritative	-.040	(-.282, .064)	100
	Authoritarian	-.065	(-.372, .173)	99
	Permissive	.122	(-.113, .506)	100
	Nonsupportive	-.007	(-.125, .066)	99

\* *Significant Confidence Interval*

Table 7

*Test of parenting variables as mediators of the relation between maternal attentional control and child BMI percentile*

Independent Variable	Mediation Variable	Indirect Effects of IV on DV through Mediator	Bootstrap (95% CI)	<i>n</i>
Maternal attentional control	Authoritative	-.004	(-.126, .048)	100
	Authoritarian	-.014	(-.161, .082)	99
	Permissive	.084	(-.075, .372)	100
	Nonsupportive	-.002	(-.082, .044)	99

\* *Significant Confidence Interval*

Table 8

*Test of parenting variables as mediators of the relation between maternal inhibitory control and child BMI percentile*

Independent Variable	Mediation Variable	Indirect Effects of IV on DV through Mediator	Bootstrap (95% CI)	<i>n</i>
Maternal inhibitory control	Authoritative	-.039	(-.275, .038)	99
	Authoritarian	-.005	(-.106, .046)	98
	Permissive	.064	(-.041, .318)	99
	Nonsupportive	-.020	(-.152, .065)	98

\* *Significant Confidence Interval*

## CHAPTER V

### DISCUSSION

#### **Summary of Results**

The purpose of the current study was to examine the hypothesized mediating effect of parenting style and parenting behaviors on the relations between maternal depression, maternal temperament, and child BMI. Hypotheses were formed predicting significant positive correlations between child BMI percentile and maternal depression, maternal frustration reactivity, maternal activation control, maternal attentional control, maternal inhibitory control, authoritarian parenting style, permissive parenting style, and nonsupportive responses (hypotheses 1 and 2). Pearson's correlations did not provide support for any of the predicted associations. The mediation hypothesis stated that authoritarian parenting style, permissive parenting style, and nonsupportive responses would mediate the relations between maternal depression, maternal frustration reactivity, maternal activation control, maternal attentional control, and maternal inhibitory control with child BMI (hypothesis 3). The tests of mediation did not provide support for the predicted partial mediation.

#### **Interpretation of Results**

The overall goal of the current study was to examine how the balance between capabilities and demands on the individual and family levels contribute to the significant risk of childhood overweight and obesity. The unique relations between maternal intrapersonal variables and the parent-child interpersonal context were analyzed to test the translation pathway of stress from parent to child. While the tests of mediation were found to be nonsignificant, information can still be gained since unexpected results did shed light on pathways that may “translate”

family dynamics into child outcomes (Harrist et al., 2012). This section will incorporate the current study's results into the family resilience and family stress theoretical basis for childhood overweight and obesity, discuss the possible reasons for the nonsignificant findings, and provide some suggestions for how these results may inform future research.

### Tests of Mediation

First, when examining the correlation matrix, multiple significant associations were found for pathway *a* in mediation (see Figure 4 below), or the associations between maternal intrapersonal variables and the parenting mediators; however, the other analyses for mediation pathways *b*, *c*, and *c'* were found to be nonsignificant. This exception was the relation between maternal depression and child BMI, as maternal depression was significantly negatively correlated with child BMI. Maternal temperament, parenting styles, and nonsupportive responses, however, were not significantly associated with child BMI.

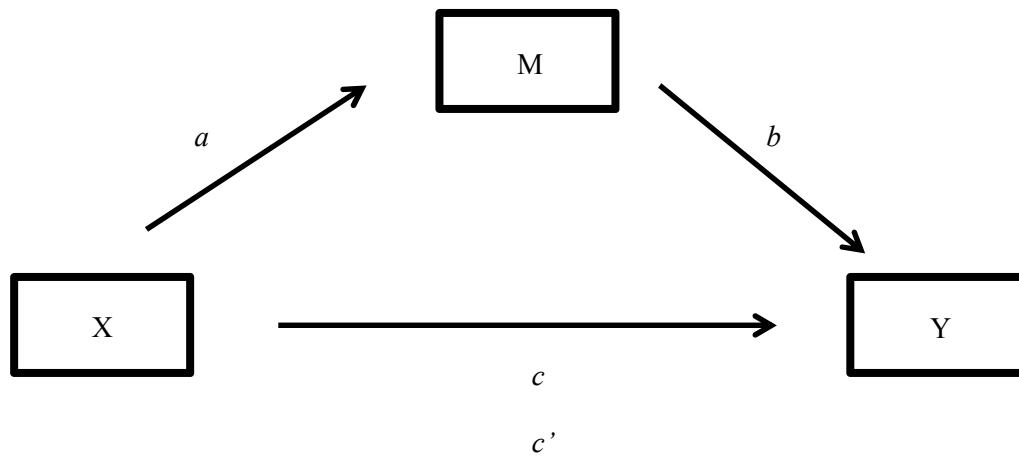


Figure 4. Mediation pathway. *X*= independent variable, *M*= Mediator, *Y*= dependent variable

### **Maternal Intrapersonal Variables and Child Weight Problems (Pathway c)**

Given the previous literature that connected maternal depression with family/child obesogenic lifestyle patterns and higher child weight, I expected to find a significant positive association between maternal depression, maternal temperament, and child BMI (Goulding et al., 2014; Wang et al., 2013). In this study, maternal depression was significantly negatively related to child BMI while maternal temperament was not significantly related to child BMI. The significant relation between maternal depression and child BMI suggests that maternal depression does place a significant demand and increase the stress placed on families; although, maternal depression did not influence children in the expected direction. To better understand the relation between maternal depression and child BMI, an ANOVA was run with child BMI as a categorical dependent variable: non-overweight (< 85<sup>th</sup> percentile), overweight (85- 95<sup>th</sup> percentile), and obese ( $\geq$  95<sup>th</sup> percentile; Center for Disease Control, 2009). No significant differences were found between the groups.

One possibility that may help explain the negative association between maternal depression and child BMI as well as the lack of differences at one time point is that child age may moderate the relation between maternal depression and child BMI. Duarte et al. (2012) found that the comparison of girls' weight in kindergarten and fifth grade were different. First, in kindergarten, girls of mothers who reported severe depressive symptomology had significantly lower BMI-z scores when compared to girls of mothers with non-severe depressive symptoms. Interestingly, in fifth grade, the same girls no longer weighed significantly different than girls of mothers with non-severe depressive symptoms. In addition to comparing child BMI-z scores between children with depressed and children with non-depressed mothers, Duarte et al. also examined the correlation of BMI-z scores to severity of maternal depression. They found that severe maternal depression at kindergarten was not related to girls' BMI-z in kindergarten, third grade, or fifth grade, however, when severe maternal depression was present in third grade, there was a significant association with girls' higher BMI-z in fifth grade. For boys, severe maternal



depression in kindergarten was significantly related to boys' BMI-z in fifth grade only. This suggests child age has the potential to change the relation between maternal depression and child BMI.

Duarte and colleagues hypothesized about why children of depressed mothers would have lower weight at younger ages and then increase in weight over time. They hypothesized that at younger ages children rely more on parents for their caloric intake; therefore, if parents are depressed, uninvolved, or have difficulty motivating themselves to arrange/prepare food for their children, children may weigh less until they can feed themselves. Child may not have the capabilities necessary to overcome the demands that maternal depression places on the family system. Duarte et al. suggested that the increase in weight from kindergarten to fifth grade reflects a period of time for girls of mothers with severe depression when they "catch up" in weight to girls of mothers with non-severe depressive symptomology (p. 127). It could be that as the girls developed from kindergarten to fifth grade, a lack of self-regulation and/or participation in obesogenic lifestyle patterns could lead them to have higher BMIs by fifth grade. This gain in weight would be seen as an additional stress or demand on the family system once children's weight reaches unhealthy levels. Topham and colleagues (2011) found that authoritarian parenting style predicted more child emotional eating in first grade; therefore, if emotional eating is one mechanism through which parental depression influences child weight, it could be that the effects would not show up in children weight until fifth grade or later. When considering obesogenic lifestyle patterns, for boys, Duarte et al. found that less healthy eating mediated the relation between maternal depression in kindergarten and higher BMI-z in fifth grade only. As a result, it could be that child BMI measured in fifth grade or beyond is more likely to show significant relations between maternal intrapersonal variables, parenting styles, or parenting behaviors due to child age differences that interact with the stress of maternal depression over time and change the likelihood of children becoming overweight or obese.

Other moderators could also influence families' risk of childhood overweight and obesity through the balance of capabilities and demands; thus, changing the association between maternal intrapersonal variables and child BMI. Child temperament may be one important moderator to examine. Lipscomb et al. (2012) found that child temperament was a significant mediator between maternal self-regulation and child externalizing problems. When parents had lower levels of self-regulation, only children with higher levels of negative emotionality were more prone to behaviorally act out. It could be that the presence of parental depression or reactive parental temperament will only significantly impact child weight for children with more negative temperaments or poorer self-regulation because these children may lack the capabilities to cope with the stress from the negative parent-child interactions.

Parenting variables may also moderate the association between maternal intrapersonal variables and child BMI. Parenting styles or parenting behaviors may moderate rather than mediate the association between maternal depression, maternal temperament, and child BMI. It could be that parental availability may significantly increase families' vulnerability to childhood overweight and obesity only when parents already have controlling/demanding parenting that lacks warmth and understanding toward children. The combination of stressors may create a pileup of demands placed on the family system. Additionally, parental self-awareness may moderate the association between parental intrapersonal variables and parenting styles or parenting behaviors. It could be that parents who have better self-awareness are able to intervene in their actions toward their children despite their automatic reactivity. The pathway from negative intrapersonal variables to negative parenting practices may only be significant for parents who lack self-awareness to intervene in their own behaviors.

### **Maternal Intrapersonal Variables and Interpersonal Contexts (Pathway *a*)**

This study's significant relations between mothers' temperament and parenting styles are similar to the results of Atzaba-Poria et al. (2014). In this study, frustration reactivity was positively associated with an authoritarian parenting style. Atzaba- Poria et al. used the combined

Negative Affect scale (i.e. fear, frustration/anger, sadness, and discomfort) of the ATQ and found that maternal negative affect was significantly positively associated with maternal negativity, which captured mothers' observed negative affect and negative control toward children. Both studies found significant positive associations between negative affect and the use of controlling parenting behaviors. In the current study, activation control and attentional control were both significantly negatively associated with authoritarian parenting style. Atzaba- Poria et al. used the combined effortful control scale (i.e., activation control, attentional control, and inhibitory control) of the ATQ and found that effortful control was significantly positively correlated with maternal positivity and significantly negatively correlated with maternal negativity. Maternal positivity captured observed positive affect and positive control (e.g. use of praise and encouragement, verbal elaboration of child activity). These results support the results of this study that higher levels of effortful control make it more likely that mothers will engage in positive parenting practices and less likely they will engage in negative parenting practices.

In this study, maternal depression was also significantly positively associated with authoritarian parenting style. Research by Turney (2011) supports these findings indicating that maternal depression was significantly connected to negative parenting practices (i.e. neglect, psychological aggression, physical assault, and less engagement with child). When examined through various regression models, the results suggested maternal depression is linked but may not specifically lead to more negative parenting behaviors. When considered together, the results of this study and previous research suggest that maternal temperament and depression do influence parenting. This influence on parenting could contribute to a pileup of demands (the presence of negative intrapersonal variables and less effective parenting practices) on families that would create negative outcomes if families lacked the capabilities to create balance.

### **Interpersonal Contexts and Child Weight Problems (Pathway *b*)**

Based on previous literature, I expected to find a significant association between parenting styles, parenting behaviors, and child BMI. Pinquart et al. (2014) conducted a meta-

analysis that examined the relations between general parenting (not related to food or eating), the parent-child relationship, and pediatric obesity. The results showed that a better parent-child relationship, higher levels of parental responsiveness, and authoritative parenting style were significantly associated with positive child outcomes that were related to child BMI, such as lower child body weight, more physical activity, and healthy eating. Furthermore, when parents engage in negative parenting practices, such as overprotection, psychological control, and parental inconsistency children tend to have higher body weight. Vollumer and Mobley (2013) also conducted a review that included an examination of parenting, parenting styles, and child weight. The results showed significant associations between authoritarian and permissive parenting styles and higher child weight or BMI. The results of the current study did not show significant relations between any of the parenting styles, nonsupportive parenting, and child BMI.

One possible reason for the differences in my findings from prior research is the differences in child age. Pinquart et al. had a mean age = 11.62 while Vollumer and Mobley included data from both school-aged children and adolescents. Similar to the discussion above regarding how child age may moderate the effects of maternal intrapersonal variables and child BMI, moderation may also play a part in the associations between parenting and child BMI. It could be that parenting styles and non-supportive parenting may be significantly associated with child BMI when children are older because of an increase in child autonomy. School age children still rely on parents to help them self-regulate and learn appropriate behavior, however, as children age they have more autonomy to access food, choose sedentary activities, and establish their own sleep schedules. It could be that parenting that is harsher and uninvolved will lead to higher child weight for children who have greater autonomy to increase their weight.

Additionally, family SES and child self-regulation may also moderate the relations between parenting and child BMI. Topham et al. (2009) found that maternal SES moderated the association between permissive parenting style and child obesity. Children were more likely to be obese with higher levels of maternal permissive parenting style, but only for mothers with high

SES. Topham and colleagues suggested this reflected an indulgent family lifestyle with less parental involvement that often results in children who fail to develop effective self-regulation capabilities. It may be that children of non-authoritative parents who respond non-supportively are more likely to be overweight and obese if there is more food available in the household and when they have lower levels of self-regulation. Again, the interactions between capabilities and demands that increase family risk can be seen for pathway *b* as well. When families are under the stress of negative parenting styles or behaviors without the capabilities to combat that stress, negative outcomes are likely to be seen in children.

### **Child BMI Outcome Variable Type**

The mediation results may also be better understood by looking at the different ways that previous literature has analyzed child BMI. In their review of 71 studies, Sleddens et al. (2011) highlighted that there have been mixed results regarding the significant relations between child weight status and general parenting depending on the characteristics of the outcome variable. Significant relations between general parenting and child BMI were found more often for continuous BMI rather than categorical BMI; however, continuous child BMI can be measured as raw BMI scores, BMI percentile, or standardized BMI scores (BMI-*z* scores). The studies cited by Sleddens and colleagues found significant results between general parenting and child BMI using BMI-*z* scores. When using BMI-percentile, as this study did, McConley et al. (2011) found mixed results for the association between parental variables and child BMI with a child sample that had a mean age of 11.62 years. Child BMI percentile was significantly positively associated with maternal depression, but nonsignificantly associated with maternal nurturance, which was measured as child reports of mothers' levels of encouragement and guidance. This study also found that authoritarian parenting and permissive parenting were not significantly related to child BMI percentile. Both studies found that parenting that lacked warmth and/or support was nonsignificantly related to child BMI percentile. Both studies also found that maternal depression was significantly related to child BMI percentile.

## **Clinical Implications**

The results of this study can be helpful for clinicians when working with parent-child relationships. Of particular interest are significant associations between the maternal temperament variables and the parenting styles, especially as the temperament literature is just beginning to be connected to parenting (Atzaba-Poria et al., 2014). Clinicians could benefit from recognizing and understanding parents' automatic reactions and ability to control/direct themselves. The results of this study suggest that parents who respond with automatic frustration, who are less able to motivate themselves, direct their attention, take others' perspectives, and stop the self from doing certain things (Evans & Rothbart, 2007) are more likely to use parenting techniques that are connected with worse child outcomes (Topham et al., 2011; Vollmer & Mobley, 2013). As a result, it could be effective to intervene at the parent level to help address child problems, particularly since parents are already one of children's main emotion socialization agents (Eisenberg, Cumberland, & Spinrad, 1998) and with whom they spend the most time. It would be important for clinicians to help increase parents' awareness of their own automatic reactivity that fuels their parenting in order to help move them toward more effective and appropriate parenting. Research has shown that children show the most positive outcomes when parents are attuned and responsive to their children's needs while still being able to set appropriate limits (Mills et al., 2012; Topham et al., 2011).

## **Limitations and Future Research**

One goal of the current study was to shed light on the pathway that translates family dynamics into child outcomes (Harrist et al., 2012). The results showed that there are connections between maternal intrapersonal variables and their parenting, but more needs to be understood about how parenting influences child BMI. Study limitations could help explain some of the non-significant findings. First, the child BMI data were heavily negatively skewed and underwent transformations in order to increase its normalcy. The data transformation itself did not negatively impact analyses, however, the findings of the study may have been negatively affected because

the data remained somewhat skewed even after the transformation. Another important limitation to acknowledge is use of parent-reported measures. Besides child BMI, each variable depended on the perspective of the parent. Future research could include data from different sources. In addition, other mediating variables may also help explain the pathway from parent to child. While traditional mediation analyses, such as Sobel (Baron & Kenny, 1986), required a significant associations for pathway  $c$  to find an indirect effect, bootstrapping mediation does not require this pathway to be significant to find a significant indirect effect due to distribution sampling methods (Little, Card, Bovaird, Preacher, & Crandall, 2007).

### **Obesogenic Lifestyle Mediators**

Future research should examine the pathway from parent variables to child outcomes by adding additional mediating variables, such as obesogenic lifestyle variables. Additional mediation variables could enhance our understanding of what variables and pathways contribute specifically to childhood overweight and obesity. The only variable in the model by Harrist et al. (2012) that was directly significantly related to child BMI was child obesogenic lifestyle variables, including poor dietary intake and low physical activity. Previous research has consistently linked higher child BMI and poor dietary intake and low physical activity (Duarte et al., 2012; Fernald, 2008; McConely et al., 2011). Children's sleep levels, healthy eating, and screen time may also serve as mediators between interpersonal contexts and child weight problems. When considering sleep patterns, Gross et al. (2013) found that children of mothers with mild to moderate depressive symptoms were more likely to have less sleep per day. Maternal depression in kindergarten was also related to higher levels of screen time on weekends (Duarte et al., 2012).

In addition, future research should explore the inclusion of parent obesogenic lifestyle patterns as they may add to the mediation pathway from parental predictor variables to child outcomes. In fact, the only interpersonal context that was directly significantly related to child weight problems in the Harrist et al. (2012) model was obesogenic family food and lifestyle

patterns, including poor feeding climate, low physical activity, short sleep duration, and negative parent perception of child weight. In recent literature, parental feeding styles has been examined, in concert with parenting styles, including warmth/responsiveness and demandingness/control, and has been applied specifically to contexts involving food. The pathway may need to include maternal feeding styles rather than, or in addition to, parenting styles or parenting behaviors. Gross et al. (2013) found that mothers with depressive symptoms were less likely to set limits around food, to use food as a reward, and to model healthy eating habits for their children while mothers with moderate to severe depressive symptoms were less likely to restrict their child's intake of food. Mild maternal depressive symptoms were also related to higher sugary drink consumption per day for children, more irregular breakfast routines, and more frequent eating out for dinner than mothers without depressive symptomology. Future research should examine various mediation pathways from parent to child to better understand if different domains of functioning (i.e., general parenting and parental feeding styles) work together to significantly impact child BMI.

Based on my results, future research should also examine a few curious findings. In combination with Duarte et al. (2012), my findings suggest that children of depressed mothers may be lighter than children of non-depressed mothers before fifth grade. Future research should look at how child age and other variables may moderate the relations between parent predictor variables and child outcomes. Furthermore, it could be helpful to examine if there are predictor variables that are related to a change in child BMI over time. Rather than only examining if variables are associated with higher weight in children at particular time points, it could be beneficial to understand if variables are related to changes in child BMI. In addition, the results of this study helped expand the growing literature base on the effects of parental temperament on parenting practices; however, there is still more to learn about how parental temperament affects children's health and weight. The literature on child health and weight can also be enhanced by a comparison between the different ways child weight is measured as an outcome variable. It could



be that relations will be different if child weight is analyzed as categorical BMI, cut off BMI, raw BMI, BMI-z, or BMI percentiles.

### **Conclusion**

This study sought to examine the potential mediating role of parenting styles and parenting behaviors between maternal depression, maternal temperament, and child BMI. Previous research supported the links between variables; however, it had not examined the mediating roles of parenting style and parenting behaviors. Therefore, it was hypothesized that parenting styles and parenting behaviors would mediate the relations between maternal depression, maternal temperament, and child BMI. Mediation analyses did not provide support for mediation, which suggests there may be other analyses that explain the pathway between parents and children. Testing moderation in future research would be an important approach to making sense of some of this study's findings. This study also contributes to the current body of research by supporting the connection between maternal temperament variables and parenting variables. As this literature is still relatively small, these results help demonstrate the importance of attending to parents' intrapersonal characteristics as well as their parenting behaviors for prevention and intervention.

## REFERENCES

- Achtergarde, S., Postert, C., Wessing, I., Romer, G., & Muller, J. M. (2015). Parenting and child mental health: Influences of parent personality, child temperament, and their interaction. *The Family Journal: Counseling and Therapy for Couples and Families*, *23*, 167-179. doi:10.1177/1066480714564316
- Atzaba-Poria, N., Deater-Deckard, K., & Bell, M. A. (2014). It takes more than one for parenting: How do maternal temperament and child's problem behaviors relate to maternal parenting behavior? *Personality and Individual Differences*, *69*, 81-86. doi:10.1016/j.paid.2014.05.002
- Bariola, E., Hughes, E. K., & Gullone, E. (2012). Relationships between parent and child emotion regulation strategy use: A brief report. *Journal of Child and Family Studies*, *21*, 443-448. doi:10.1007/s10826-011-9497-5
- Baron, R. M. & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, *51*, 1173-1182. doi:10.1037/0022-3514.51.6.1173
- Baumrind, D. (1991). The influence of parenting style on adolescent competence and substance use. *Journal of Early Adolescence*, *11*, 56- 95. doi:10.1177/02724316911111004
- Bergmeier, H., Skouteris, H., Horwood, S., Hooley, M., & Richardson, B. (2014). Child temperament and maternal predictors of preschool children's eating and body mass index. A prospective study. *Appetite*, *74*, 125-132. doi:10.1016/j.appet.2013.12.006

- Braungart-Rieker, J. M., Moore, E. S., Planalp, E. M., & Lefever, J. B. (2014). Psychosocial pathways to childhood obesity: A pilot study involving a high risk preschool sample. *Eating Behaviors, 15*, 528-531. doi:10.1016/j.eatbeh.2014.07.004
- Bridgett, D. J., Burt, N. M., Laake, L. M., & Oddi, K. B. (2013). Maternal self-regulation, relationship adjustment, and home chaos: Contributions to infant negative emotionality. *Infant Behavior and Development, 36*, 534- 47. doi:10.1016/j.infbeh.2013.04.004
- Centers for Disease Control and Prevention. (2009). What is Epi Info™? <http://www.cdc.gov/epiinfo> (accessed November 2009).
- Centers for Disease Control and Prevention. (2015). *Childhood obesity facts*. Retrieved September 21, 2015, from <http://www.cdc.gov/obesity/data/childhood.html>
- Chen, N., Deater-Deckard, K., & Bell, M. A. (2014). The role of temperament by family environment interactions in child maladjustment. *Journal of Abnormal Child Psychology, 42*, 1251- 262. doi:10.1007/s10802-014-9872-7
- Cimino, S., Cerniglia, L., & Paciello, M. (2014). Mothers with depression, anxiety or eating disorders: Outcomes on their children and the role of paternal psychological profiles. *Child Psychiatry and Human Development*. doi:10.1007/s10578-014-0462-6
- Connors-Burrow, N. A., Bokony, P., Whiteside-Mansell, L., Jarrett, D., Kraleti, S., McKelvey, L., & Kyzer, A. (2014). Low-level depressive symptoms reduce maternal support for child cognitive development. *Journal of Pediatric Health Care, 28*, 404-412. doi:10.1016/j.pedhc.2013.12.005
- Coyne, L. W., Low, C. M., Miller, A. L. Seifer, R., & Dickstein, S. (2007). Mothers' empathic understanding of their toddlers: Associations with maternal depression and sensitivity. *Journal of Child and Family Studies, 16*, 483- 497. doi:10.1007/s10826-00609099-9
- Coyne, L. W. & Thompson, A. D. (2011). Maternal depression, locus of control, and emotion regulatory strategy as predictors of preschoolers' internalizing problems. *Journal of Child and Family Studies, 20*, 873-883. doi:10.1007/s10826-011-9455-2

- Derryberry, D. & Rothbart, M. K. (1997). Reactive and effortful processes in the organization of temperament. *Development and Psychopathology, 9*, 633-652.  
doi:10.1017/S0954579497001375
- Dix, T. (1991). The affective organization of parenting: Adaptive and maladaptive processes. *Psychological Bulletin, 110*, 3-25. doi:10.1037/0033-2909.110.1.3
- Duarte, C. S., Shen, S., Wu, P. & Must, A. (2012). Maternal depression and child BMI: longitudinal findings from a US sample. *Pediatric Obesity, 7*, 124-133.  
doi:10.1111/j.2047-6310.2011.00012.x
- Ehring, T., Fischer, S., Schnulle, J., Bosterling, A., & Tischen-Caffier. (2008). Characteristics of emotion regulation in recovered depressed versus never depressed individuals. *Personality and Individual Differences, 44*, 1574-1584. doi:10.1016/j.paid.2008.01.013
- Evans, D. E., & Rothbart, M. K. (2007). Developing a model for adult temperament. *Journal of Research in Personality, 41*, 868-888. doi:10.1016/j.jrp.2006.11.002
- Evans, D. E., & Rothbart, M. K. (2009). A two factor models of temperament. *Personality and Individual Differences, 47*, 565-570. doi:10.1016/j.paid.2009.05.010
- Fabes, R. A., Poulin, R. E., Eisenberg, N., & Madden-Derdich, D. A. (2002). The Coping with Children's Negative Emotions Scale (CCNES): Psychometric properties and relations with children's emotional competence. *Marriage & Family Review, 34*, 285-310.
- Fabes, R. A., Eisenberg, N., & Bernzweig, J. (1990). *Coping with Children's Negative Emotions Scale (CCNES): Description and scoring*. Tempe, AZ: Arizona State University.
- Feng, X., Shaw, D. S., Skuban, E. M., & Lane, T. (2007). Emotional exchange in mother-child dyads: Stability, mutual influence, and associations with maternal depression and child problem behavior. *Journal of Family Psychology, 21*, 714-725. doi:10.1037/0893-3200.21.4.714
- Fernald, L. C. H., Jones-Smith, J. C., Ozer, E. J., Neufeld, L. M., & DiGirolamo, A. M. (2008). Maternal depressive symptoms and physical activity in very low-income children.

*Journal of Developmental & Behavioral Pediatrics*, 29, 385-393.

doi:10.1097/DBP.0b013e318182a98e

Goodman, S. H., Adamson, L. B., Riniti, J., & Cole, S. (1994). Mothers expressed attitudes: Associations with maternal depression and children's self-esteem and psychopathology. *Journal of the American Academy of Child and Adolescent Psychiatry*, 33, 1265-1274. doi:10.1097/00004583-199411000-00007

Goodman, S. H., Rouse, M. H., Connell, A. M., Robbins Broth, M., Hall, C. M., Heyward, D. (2011). Maternal depression and child psychopathology: A meta-analytic review. *Clinical Child and Family Psychology Review*, 14, 1-27. doi:10.1007/s10567-010-0080-1

Goldsmith, H. H., Buss, A. H., Plomin, R., Rothbart, M. K., Thomas, A., Chess, S., Hinde, R. A., & McCall, R. B. (1987). Roundtable: What is temperament? Four approaches. *Child Development*, 58, 505-529. doi:10.2307/1130527

Goulding, A. N., Rosenblum, K. L., Miller, A. L., Peterson, K. E., Chen, Y., Kaciroti, N., & Lumeng, J. C. (2014). Associations between maternal depressive symptoms and child feeding practices in a cross-sectional study of low-income mothers and their young children. *International Journal of Behavioral Nutritional and Physical Activity*, 11(75), 1-11. doi:10.1186/1479-5868-11-75

Gross, R. S., Velazco, N. K., Briggs, R. D., & Racine, A. D. (2013). Maternal depressive symptoms and child obesity in low-income urban families. *Academic Pediatrics*, 13(4), 356- 363. doi:10.1016/j.acap.2013.04.002

Harrist, A. W., Hubbs-Tait, L., Topham, G. L., Shriver, L. H., & Page, M. C. (2013). Emotion regulation is related to children's emotional and external eating. *Journal of Developmental and Behavioral Pediatrics*, 34, 557-565. doi:10.1097/DBP.0b013e3182a5095f

Harrist, A. W., Topham, G. L., Hubbs-Tait, L., Page, M., Kennedy, T. S., & Shriver, L. H. (2012). What developmental science can contribute to a transdisciplinary understanding

- of childhood obesity: An interpersonal and intrapersonal risk model. *Child Development Perspectives*, 6, 445-455. doi:10.1111/cdep.12004
- Hesketh, K., Wake, M., & Waters, E. (2004). Body mass index and parent-reported self-esteem in elementary school children: Evidence for a causal relationship. *International Journal of Obesity*, 28, 1233-1237. doi:10.1038/sj.ijo.0802624
- Hoffman, C., Crnic, K. A., & Baker, J. K. (2006). Maternal depression and parenting: Implications for children's emergent emotion regulation and behavioral functioning. *Parenting: Science and Practice*, 6, 271-295. doi:10.1207/s15327922par0604\_1:
- Holden, G.W. (2010). Childrearing and developmental trajectories: Positive pathways, off-ramps, and dynamic processes. *Child Development Perspectives*, 4(3), 197-204. doi:10.1111/j.1750-8606.2010.00148.x
- Hooper, E., Feng, X., Christian, L., & Slesnick, N. (2015). Emotion expression, emotionality, depressive symptomology, and stress: Maternal profiles related to child outcomes. *Journal of Abnormal Psychology*. doi:10.1007/s10802-015-0019-6
- Hudson, M. R., Harding, K. A., & Mezulis, A. (2015). Dampening and brooding jointly link temperament with depressive symptoms: A prospective study. *Personality and Individual Differences*, 83, 249-254. doi:10.1016/j.paid.2015.04.025
- Hughes, S. O., Power, T. G., Papaioannou, M. A., Cross, M. B., Nicklas, T. A., Hall, S. K. & Shewchuk, R. M. (2011). Emotional climate, feeding practices, and feeding styles: An observational analysis of the dinner meal in Head Start Families. *International Journal of Nutritional and Physical Activity*, 8. Retrieved from <http://www.ijbnpa.org/content/8/1/60>
- Hughes, S. O. & Shewchuk, R. M. (2012). Child temperament, parent emotions, and perceptions of the child's feeding experience. *International Journal of Behavioral Nutrition and Physical Activity*, 9(64), 1-9. doi:10.1186/1479-5868-9-64
- Jung, E., Raikes, H. H., & Chazan-Cohen, R. (2013). Maternal depressive symptoms and behavior problems in preschool children from low-income families: Comparison of

- reports from mothers and teachers. *Journal of Child and Family Studies*, 22, 757-768.  
doi:10.1007/s10826-012-9630-0
- Kelsey, M. M., Zaepfel, A., Bjornstad, P., & Nadeau, K. J. (2014). Age-related consequences of obesity. *Gerontology*, 60, 222-228. doi: 10.1159/000356023
- Kolody, B., & Sallis, J. F. (1995). A prospective study of ponderosity, body image, self-concept, and psychological variables in children. *Developmental and Behavioral Pediatrics*, 16, 1-5. doi:10.1097/00004703-199502000-00001
- Lampard, A. M., Franckle, R. L., & Davison, K. K. (2014). Maternal depression and childhood obesity: A systematic review. *Preventative Medicine*, 59, 60-67.  
doi:10.1016/j.ypmed.2013.11.020
- Lei, H., Zhang, X., Cai, L., Yuping, W., Bai, M., & Zhu, X. (2014). Cognitive emotion regulation strategies in outpatients with major depressive disorder. *Psychiatry Research*, 218, 87-92.  
doi:10.1016/j.psychres.2014.04.025
- Liem, E. T., Buuren, S. V., Sauer, J. J., Jaspers, M., Stolk, R. P., & Reijneveld, S. A. (2013). Growth during infancy and childhood, and adiposity at age 16 years: Ages 2 to 7 years are pivotal. *Journal of Pediatrics*, 162, 287-294. doi:10.1016/j.jpeds.2012.07.053
- Lipscomb, S.T., Leve, L.D., Shaw, D.S., Neiderhiser, J.M., Scaramella, L.V., Ge, S., Conger, R.D., Reid, J.B., & Reiss, D. (2012). Negative emotionality and externalizing problems in toddlerhood: Over reactive parenting as a moderator of genetic influences. *Developmental Psychology*, 24, 167-179. doi:10.1017/S095459411000757
- Little, T. D., Card, N. A., Bovaird, J. A., Preacher, J. K., & Crandall, C. S. (2007). Structural equation modeling of mediation and moderation with contextual factors. In *Modeling contextual effects in longitudinal studies* (pp. 207-230) Mahwah, NJ: Erlbaum. Retrieved from  
<http://search.proquest.com.argo.library.okstate.edu/docview/621745323?accountid=4117>

- Malia, J. A. (2006). Basic concepts and models of family stress. *Stress, Trauma, and Crisis, 9*, 141-160. doi:10.1080/15434610600853717
- Maughan, A., Cicchetti, Toth, L. S., & Rogosch, F. A. (2007). Early-occurring maternal depression and maternal negativity in predicting young children's emotion regulation and socioemotional difficulties. *Journal of Abnormal Child Psychology, 35*, 685-703. doi:10.1007/s10802-007-9129-0
- McConley, R. L., Mrug, S., Gilliland, M. J., Lowry, R., Elliott, M. N., Schuster, M. A., Bogart, L. M., Franzini, L., Escobar-Chaves, S. L., & Franklin, F. A. (2011). Mediators of maternal depression and family structures on child BMI: Parenting quality and risk factors for child overweight and obesity. *Obesity, 19*. 345-352. doi:10.1038/oby.2010.177
- McCubbin, H. I., & Patterson, J. M. (1983). *Family transitions: Adaptation to stress*. In H. I. McCubbin & C. Figley (Eds), *Stress and the family: Coping with normative transitions* (pp. 5-25). New York: Brunner/Mazel.
- Mills, R. S. L., Hastings, P. D., Helm, J., Serbin, L. A., Etezadi, J., Stack, D. M., Schwartzman, A. E., & Hong Li, H. (2012). Temperamental, parental, and contextual contributors to early-emerging internalizing problems: A new integrative analysis approach. *Social Development, 21*, 229-253. doi:10.1111/j.1467-9507.2011.00629.x
- Morelen, D. & Suveg, C. (2012). A real-time analysis of parent-child emotion discussions: The interaction is reciprocal. *Journal of Family Psychology, 26*, 998-1003. doi:10.1037/a0030148
- Morris, A., Silk, J. S., Steinberg, L., Myers, S. S., & Robinson, L. R. (2007). The role of the family context in the development of emotion regulation. *Social Development, 16*, 361-388. doi:10.1111/j/1467-9507.2007.00389.x
- Oddi, K. B., Murdock, K. W., Vadnais, S., Bridgett, D. J., & Gartstein, M. A., (2013). Maternal and infant temperament characteristics as contributors to parenting stress in the first year of postpartum. *Infant and Child Development, 22*, 553-579. doi:10.1002/icd



- Oyserman, D., Mowbray, C. T., Allen Mearns, P., & Firminger, K. B. (2000). Parenting among mothers with a serious mental illness. *American Journal of Orthopsychiatry*, *70*, 296-315. doi:10.1037/h0087733
- Patterson, J. M. (2002). Integrating family resilience and family stress theory. *Journal of Marriage and Family Therapy*, *64*, 349-360. doi:10.1111/j.1741-3737.2002.00349.x
- Pinquart, M. (2014). Associations of general parenting and parent-child relationship with pediatric obesity: A meta-analysis. *Journal of Pediatric Psychology*, *39*, 381-393. doi:10.1093/jpepsy/jst44
- Preacher, K. J. & Hayes, A. F. (2008). Asymptomatic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*, *40*, 879-891. doi:10.3758/BRM.40.3.879
- Prinzle, P., Stams, G. J. J. M., Dekovic, M., Reijntjes, A. H. A., & Belsky, J. (2009). The relations between parents' big five personality factors and parenting: A meta-analytic review. *Journal of Personality and Social Psychology*, *97*, 351-362. doi:10.1037/a0015823
- Radloff, L. S. (1977). The CES-D Scale: a self-report depression scale for research in the general population. *Applied Psychological Measures*, *1*, 385-401. doi:10.1177/014662167700100306
- Robinson, C. C., Mandleco, B., Olsen, S. F., & Hart, C. H. (1995). Authoritative, authoritarian, and permissive parenting practices: Development of a new measure. *Psychological Reports*, *77*(3), 819-830. doi:10.2466/pr0.1995.77.3.819
- Rothbart, M. K. (2004). Temperament and the pursuit of an integrated developmental psychology. *Merrill-Palmer Quarterly*, *50*, 492- 505.
- Sleddens, E. F. C., Gerards, S. M. P. L., Thijs, C., Vries, N. K. D., & Kremers, S. P. J. (2011). General parenting, childhood overweight and obesity-inducing behaviors: A review. *International Journal of Pediatric Obesity*. doi:10.3109/17477166.2011.566339

- Spinrad et al. (1999). The relations of parental affect and encouragement to children's moral emotions and behaviour. *Journal of Moral Education*, 28, 323-337.  
doi:10.1080/030572499103115
- Taylor, A., Wilson, C., Slater, A., & Mohr, P. (2012). Self-esteem and body dissatisfaction in young children: Associations with weight and perceived parenting style. *Clinical Psychologist*, 16, 25-35. doi:10.1111/j.1742-9552.2011.00038x
- Topham, G. L., Harrist, A. W, Kennedy, T. S., Hubbs-Tait, L., Larzelere, R., Washburn, I., Shriver, L, Page, M. (2014, November). *Effectiveness of an interdisciplinary child obesity treatment program integrating nutritional sciences and family systems approaches*. Paper presented in symposium at the annual conference of the National Council on Family Relations (NCFR), Baltimore, MD.
- Topham, G. L., Hubbs-Tait, L., Rutledge, J. M., Page, M. C., Shriver, L. H., & Harrist, A. W. (2011). Parenting styles, parental response to child emotion, and family emotional responsiveness are related to child emotional eating. *Appetite*, 56, 261-264.  
doi:10.1016/j.appet.2011.01.007
- Topham, G. L., Page, M. C., Hubbs-Tait, L., Rutledge, J. M., Kennedy, T. S., Shriver, L., & Harrist, A. (2009). Maternal depression and socio-economic status moderate the parenting style/child obesity association. *Public Health Nutrition*, 13, 1237-1244.  
doi:10.1017/S136890009992163
- Tsiros, M. D., Olds, T., Buckley, J. D., Grimshaw, P., Breenan, L., Walkley, J., Hills, A. P., Howe, O. R. C., & Coates, A. M. (2009). Health-related quality of life in obese children and adolescents. *International Journal of Obesity*, 33, 387-400. doi:10.1038/ijo.2009.42
- Turney, K. (2011). Labored love: Examining the link between maternal depression and parenting behaviors. *Social Science Research*, 40, 399-415. doi:10.1016/j.ssresearch.2010.09.009

- Ul-Haq, A., Mackay, D. F., Fenwick, W., & Pell, J. P. (2013). Meta-analysis of the association between body mass index and health-related quality of life among children and adolescents addressed using the pediatric quality of life inventory index. *The Journal of Pediatrics*, *162*, 280-287. doi:10.1016/j.jpeds.2012.07.049
- Vasey, M. W., Harbaugh, C. N., Fisher, L. B., Heath, J. H., Hayes, A. F., & Bijttebier, P. (2014). Temperament synergies in risk for a protection against depressive symptoms: A prospective replication of a three-way interaction. *Journal of Research in Personality*, *53*, 134-147. doi:http://dx.doi.org/10.1016/j.jrp.2014.09.005
- Vasey, M. W., Harbaugh, C. N., Lonigan, C. J., Phillips, B. M., Hankin, B. L., Willem, L., & Bijttebier, P. (2013). Dimensions of temperament and depressive symptoms: Replicating a three-way interaction. *Journal of Research in Personality*, *47*, 908-921. doi:http://dx.doi.org/10.1016/j.jrp.2013.09.001
- Vollmer, R.L. & Mobley, A.R. (2013). Parenting styles, feeding styles, and their influence on child obesogenic behaviors and child weight. A review. *Appetite*, *71*, 232- 241.
- Walsh, F. (2012). Family resilience: Strengths forged through adversity. In F. Walsh (Ed.), *Normal family processes: Growing diversity and complexity* (4th ed., pp. 399-427). New York, NY: Guilford.
- Wang, L., Anderson, J. L., Dalton, W. T. III, Wu, T., Liu, X., Zheng, S., & Liu, X. (2013). Maternal depressive symptoms and the risk of overweight in their children. *Maternal and Child Health Journal*, *17*, 940-948. doi:10.1007/s10995/012/1080-1
- Webber, L., Hill, C., Saxton, J., Van Jaarsveld, C. H. M., & Wardle, J. (2009). Eating behaviour and weight in children. *Pediatric Highlight*, *33*, 21-28. doi:10.1038/ijo.2008.219
- World Health Organization. (2004). Global strategy on diet, physical activity and health. Available at: <http://www.who.int/dietphysicalactivity/childhood/en/>. Accessed August 23. 2014.

APPENDICES

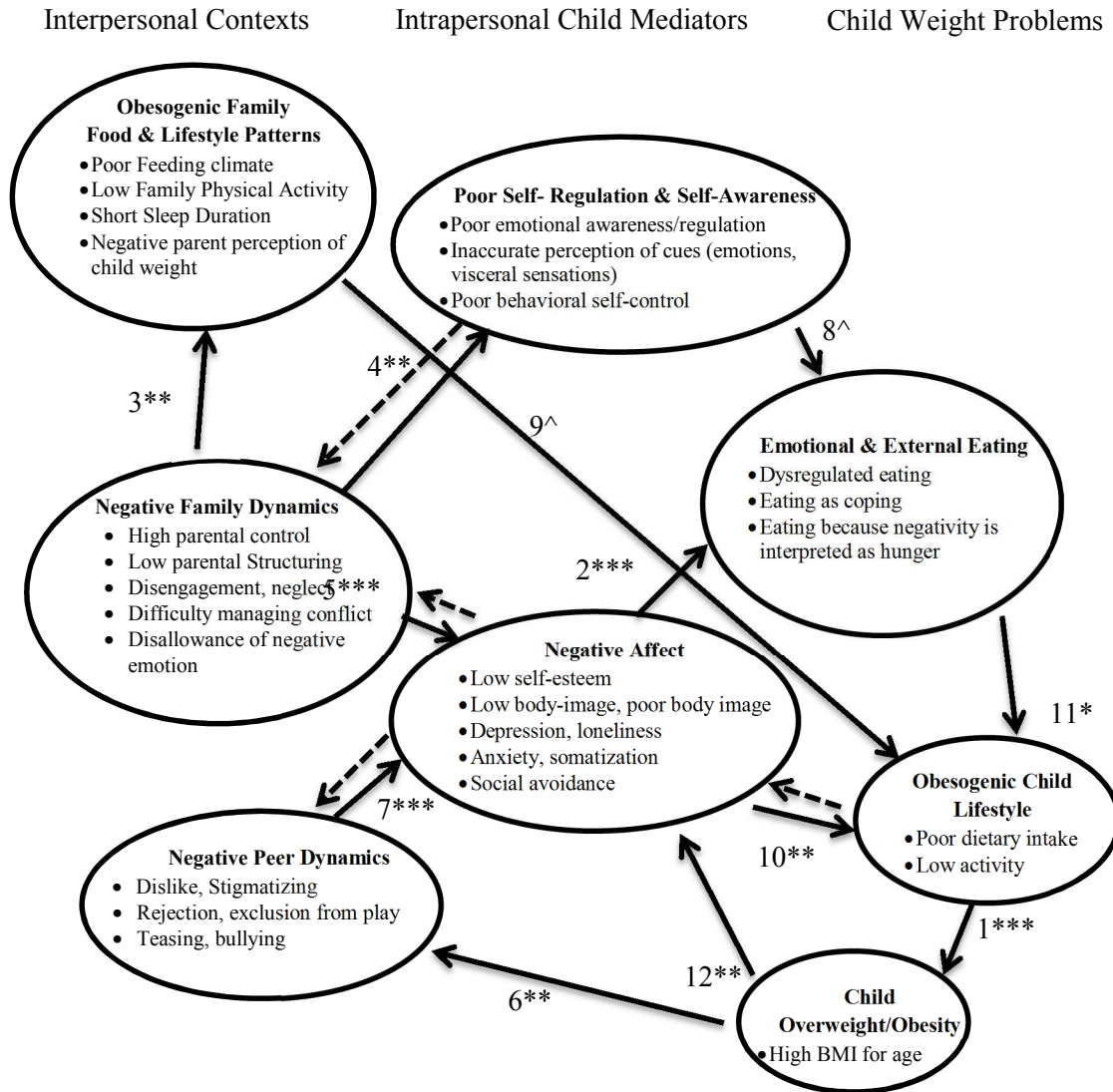


Figure 1. Harrist et al. (2012) Interpersonal and intrapersonal risk model of child obesity.  
 Note. \*\*\*Strong, consistent empirical support; \*\*some empirical support; \*mixed findings;  
 ^hypothesized; dashed lines represent bidirectional paths.

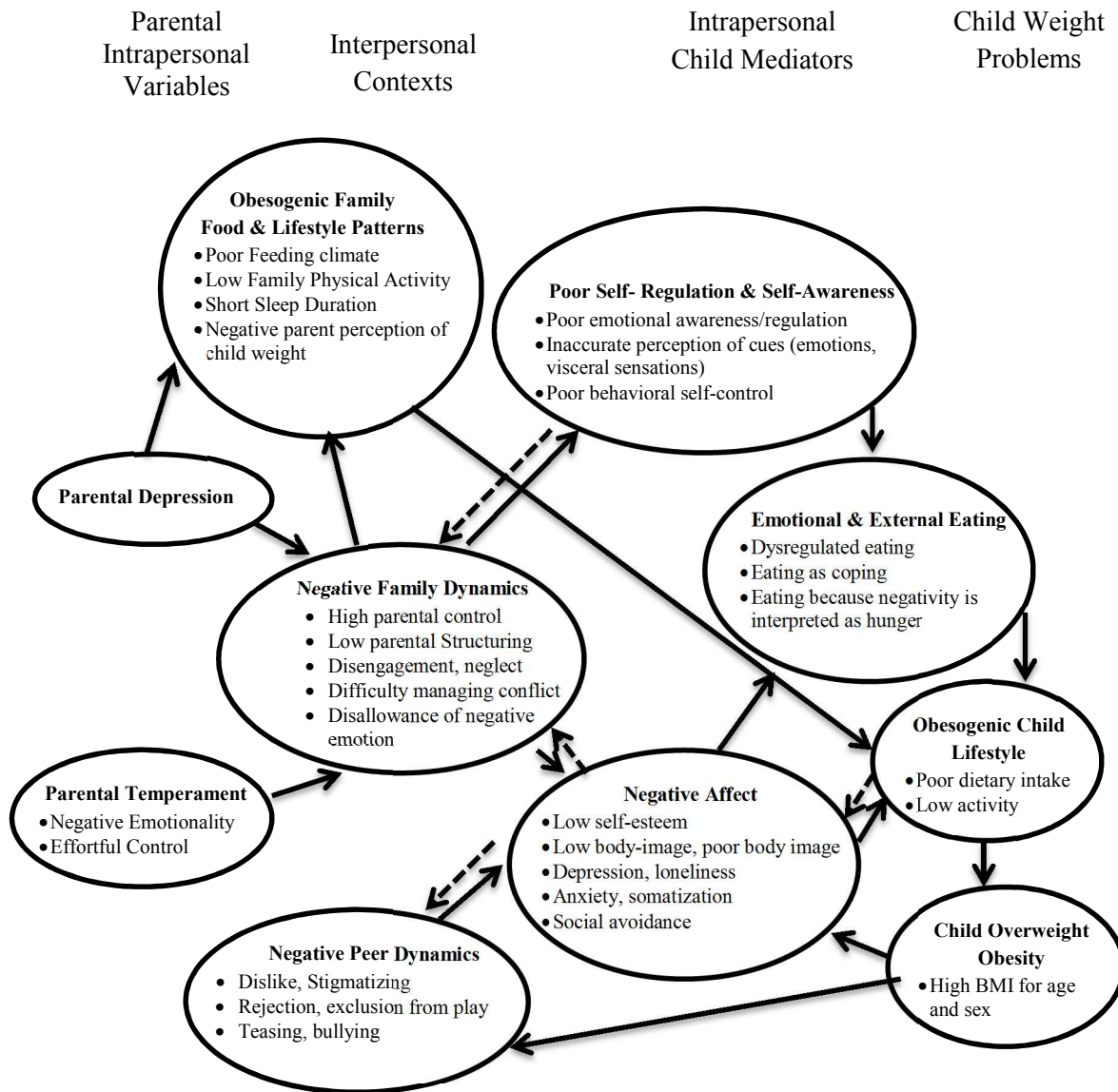
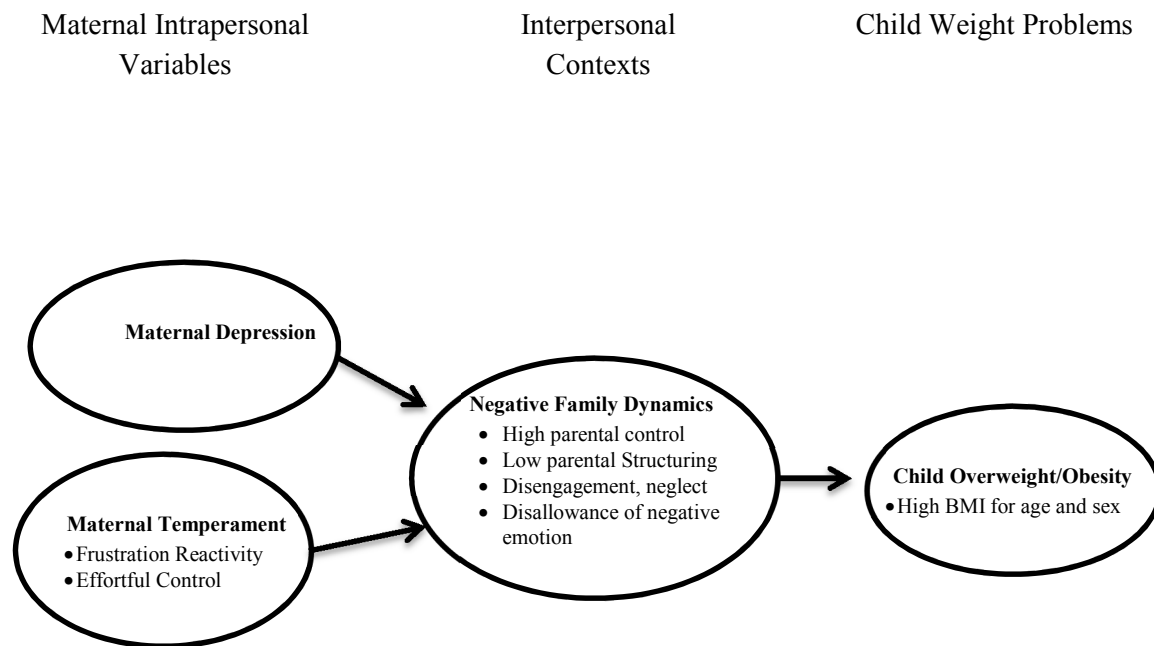


Figure 2: Expanded Harrist et al. (2012) intrapersonal and interpersonal risk model of childhood obesity. Used with permission.



*Figure 3. Proposed relationships between intrapersonal and interpersonal risk model for childhood obesity*

## Oklahoma State University Institutional Review Board

Date: Monday, October 26, 2015  
IRB Application No HE1562  
Proposal Title: Effects of maternal depression, maternal temperament, and parenting on childhood overweight and obesity  
Reviewed and Processed as: Exempt

**Status Recommended by Reviewer(s): Approved Protocol Expires: 10/25/2018**

Principal Investigator(s):

Erin Sesemann  
Stillwater, OK 74078

Glade Topham  
243 HES  
Stillwater, OK 74078

---

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Dawnett Watkins 219 Scott Hall (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,



Hugh Crethar, Chair  
Institutional Review Board

VITA

Erin Sesemann

Candidate for the Degree of

Master of Science

Thesis: EFFECTS OF MATERNAL DEPRESSION, MATERNAL TEMPERAMENT, AND PARENTING ON CHILD OVERWEIGHT AND OBESITY

Major Field: Human Development and Family Science

Biographical:

Education:

Completed the requirements for the Master of Science in Human Development and Family Science with an option in Marriage and Family Therapy at Oklahoma State University, Stillwater, Oklahoma in December 2015.

Completed the requirements for the Bachelor of Science in Psychology at Oklahoma Christian University, Edmond, Oklahoma in 2013.

Experience:

Therapy Intern at Warren Alexander Group, Stillwater, Oklahoma  
Therapy Intern at Center for Family Services, Stillwater, Oklahoma

Graduate Teaching Assistant, Oklahoma State University

Professional Memberships:

American Association for Marriage and Family Therapy (AAMFT)  
Oklahoma Association for Marriage and Family Therapy (OKAMFT)

Graduate Research Assistant, Oklahoma State University