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# The Effect Of Maternal Beliefs And Behavior On The Body Weight Status Of Preschool-Aged Children

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**THE EFFECT OF MATERNAL BELIEFS AND BEHAVIOR ON THE BODY WEIGHT  
STATUS OF PRESCHOOL-AGED CHILDREN**

by

**NICOLE BOUCHER**

**DISSERTATION**

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

**DOCTOR OF PHILOSOPHY**

2013

MAJOR: NURSING

Approved by:

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Advisor

Date

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## DEDICATION

I am dedicating this degree to my family. First I dedicate my PhD to my children, Cionna, Derrick, and Anthony. While not always with me Anthony, I do consider you one of my own. I am so blessed to have the three of you. I appreciate how hard it was at times for you to do things and not have mommy there to see them, I promise from now on to make that up to the three of you. None of you ever complained all you said was “I love you mommy.” I plan to make the school parties and field trips and be able to go do fun things on the weekends. I love all three of you to the moon and back and you mean the world to me.

I also dedicate my PhD to my parents for all the love and support they provided through the process of obtaining my PhD and the life events that also occurred during that time. Thank you for the love and support, the proofreading of paper after paper, the babysitting, and the attendance at the school parties and functions I could not attend. I am forever grateful. I am most grateful for instilling in me the value of an education. You both always asked “Where am I going to college?” not “Am I going to college?” and for that I am forever grateful, for no matter what happens in life, I can take care of myself and my children because you instilled the value of an education in me. I love you both very much

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## TABLE OF CONTENTS

Dedication.....	ii
Acknowledgements.....	iii
List of Tables.....	ix
List of Figures.....	xi
CHAPTER ONE: Introduction.....	1
Purpose of the Study.....	3
Statement of the Problem.....	4
Significance.....	8
CHAPTER TWO: Background and Significance.....	12
Definition of Childhood Obesity.....	12
Scope of the Problem.....	13
Consequences of Obesity.....	15
Etiological Factors Influencing Childhood Obesity.....	19
Pregnancy and Infancy Factors Influencing Childhood Obesity.....	24
Early Onset Childhood Obesity.....	27
Maternal Beliefs.....	28
Feeding Style and a Child's BMI.....	32
The Importance of Examining Maternal Feeding Styles.....	33
Feeding Styles.....	33
Limitations of Current Literature.....	35
Gaps in the Literature.....	37
Theoretical Framework.....	38

Overview of Self-Care Deficit Nursing Theory.....	40
Basic Philosophical Assumptions of the Self-Care Deficit Nursing Theory	40
Concepts Within the Self-Care Deficit Nursing Theory.....	49
Basic Conditioning Factors.....	49
Therapeutic Self-care Demand.....	52
Self-care.....	56
Self-care Deficit.....	60
Dependent-care.....	62
Philosophical Assumptions.....	64
Concepts and Terms in the Theory of Dependent-Care.....	65
Theory of Maternal Influence on a Child's Health.....	69
Concepts and Definitions.....	71
Pregnancy and Infancy Factors.....	77
Philosophical Assumptions of the Theory of Maternal Influence on a Child's	
Health.....	77
Philosophical Beliefs Specific to Self-Care.....	80
CHAPTER THREE: Methods.....	83
Research Design.....	84
Sample.....	84
Setting.....	86
Instruments and Measures.....	87
Cofounders.....	100
Data Collection.....	103

Protection of Human Subjects.....	106
Data Analysis.....	108
Descriptive Analysis.....	109
Analysis of Specific Aims.....	110
CHAPTER FOUR: Results.....	117
Data Screening.....	117
Descriptive Statistics.....	122
Description of Sample.....	122
Instruments.....	127
Demographic Data Sheet.....	127
Maternal Beliefs Survey.....	136
Parental Feeding Style Questionnaire.....	140
Caregiver Feeding Style Questionnaire.....	141
Child and Diet Evaluation Tool.....	142
Health.....	149
Correlation Matrix.....	154
Specific Aims.....	156
Specific Aim One.....	157
Specific Aim Two.....	159
Specific Aim Three.....	166
Specific Aim Four.....	169
CHAPTER FIVE: Discussion.....	186
Sample.....	186

Maternal Beliefs.....	187
Maternal Perception.....	187
Maternal Concern.....	190
Maternal Nutritional Belief.....	191
Maternal Belief about Child's Eating Style.....	192
Maternal Behaviors.....	193
Feeding Styles.....	193
Healthy Feeding Style and Healthy Behaviors.....	196
Food Served.....	197
Specific Aims.....	198
Aim One.....	199
Aim Two.....	203
Aim Three.....	207
Aim Four.....	208
Strengths and Limitations.....	212
Limitations.....	212
Strenghts.....	215
Implications.....	218
Theoretical.....	218
Nursing Science.....	219
Practice.....	220
Research.....	223
Conclusion.....	224



Appendix A: IRB Approval.....	226
Appendix B: Informed consent: Pilot Phase.....	227
Appendix C: Informed consent.....	232
Appendix D: Letter to mother.....	237
Appendix E: Flyer.....	238
Appendix F: Maternal Belief Survey.....	239
Appendix G: Child Activity Survey.....	241
Appendix H: Parental Feeding Style Questionnaire.....	242
Appendix I: Caregiver Feeding Style Questionnaire.....	244
Appendix J: Child and Diet Evaluation Tool.....	246
Appendix K: Demographic Data Sheet.....	254
References.....	258
Abstract.....	278
Autobiographical Statement.....	280

## LIST OF TABLES

Table 1: <i>Ages of Maternal Participants</i> .....	123
Table 2: <i>Maternal Level of Education</i> .....	124
Table 3: <i>Descriptive Statistics-Maternal Characteristics</i> .....	125
Table 4: <i>Summary of Children's Ages</i> .....	126
Table 5: <i>Summary of Children's Current BMI</i> .....	127
Table 6: <i>Summary of Household Factors</i> .....	129
Table 7: <i>Summary of Resource Factors</i> .....	133
Table 8: <i>Summary of Maternal and Infancy Factors</i> .....	135
Table 9: <i>Summary of Maternal Nutritional Beliefs</i> .....	138
Table 10: <i>Summary of Mother's Perception and Children's Actual Weight</i> .....	139
Table 11: <i>Summary of the PSFQ</i> .....	141
Table 12: <i>Summary of the CSFQ</i> .....	142
Table 13: <i>Summary of the Frequency of Food Served based on the CADET</i> .....	145
Table 14: <i>Summary of Additional Information from CADET</i> .....	146
Table 15: <i>Children's Body Weight Status</i> .....	150
Table 16: <i>Summary of Child's Activities</i> .....	152
Table 17: <i>Regression Analysis- Backward Selection Predictors of Child's BMI-for-age Percentile</i> .....	163
Table 18: <i>Hierarchical Multiple Regression Predictors of Child's BMI-for-Age Percentile</i> .....	168
Table 19: <i>Moderated Regression Analysis; Effect of Child Activity on Relationship of Indulgent Feeding Style from the CSFQ with BMI-for-age Percentile</i> .....	172

Table 20: <i>Moderated Regression Analysis; Effect of Child Activity on Relationship of Authoritative Feeding Style from the CSFQ with BMI-for-age Percentile</i> .....	172
Table 21: <i>Moderated Regression Analysis; Effect of Child Activity on Relationship of Authoritarian Feeding Style from the CSFQ with BMI-for-age Percentile</i> .....	173
Table 22: <i>Moderated Regression Analysis; Effect of Child Activity on Relationship of Control over Eating Feeding Style from the PSFQ with BMI-for-age Percentile</i> .....	174
Table 23: <i>Moderated Regression Analysis: Effect of Child Activity on Relationship of Prompting/encouraging Feeding Style from the PSFQ with BMI-for-age Percentile</i> .....	175
Table 24: <i>Moderated Regression Analysis: Effect of Child Activity on Relationship of Food Served and BMI</i> .....	176
Table 25: <i>Moderated Regression Analysis; Effect of Pregnancy and Infancy Factors on Relationship of Authoritative Feeding Style from the CSFQ with BMI-for-age Percentile</i> .....	179
Table 26: <i>Moderated Regression Analysis; Effect of Pregnancy and Infancy Factors on Relationship of Indulgent Feeding Style from the CSFQ with BMI-for-age Percentile</i> .....	180
Table 27: <i>Moderated Regression Analysis; Effect of Pregnancy and Infancy Factors on Relationship of Authoritarian Feeding Style from the CSFQ with BMI-for-age Percentile</i> .....	181
Table 28: <i>Moderated Regression Analysis; Effect of Pregnancy and Infancy Factors on Relationship of Control over Eating Feeding Style from the PSFQ with BMI-for-age Percentile</i> .....	182
Table 29: <i>Moderated Regression Analysis; Effect of Pregnancy and Infancy Factors on Relationship of Prompting/Encouraging Feeding Style from the PSFQ with BMI-for-age Percentile</i> .....	183
Table 30: <i>Moderated Regression Analysis: Effect of Pregnancy and Infancy Factors on Relationship of Food Served and BMI</i> .....	184

## LIST OF FIGURES

Figure 1: Theory of Dependent-care.....	63
Figure 2: Theory of Maternal Influence on Child's Health.....	71
Figure 3: Plot of Expected and Observed Child's BMI-for-age Percentile.....	120
Figure 4: Correlation Matrix of Major Study Variables.....	154
Figure 5: Plot of the Relationship Between BMI-for-age Percentiles.....	164
Figure 6: The interaction Between an Indulgent Feeding Style and Screen Time Greater than Two Hours per Day and a Child's BMI-for-Age Percentile.....	171
Figure 7: Maternal BMI at the Time of Pregnancy and Child's BMI-for-age Percentile.....	178

## CHAPTER 1

### CHILDHOOD OBESITY

#### Introduction

Childhood obesity has become one of the leading health concerns in the country (Centers for Disease Control, [CDC], 2011a). Obesity in childhood can lead to an increased incidence of childhood hypertension, orthopedic complications, elevated cholesterol levels, type II diabetes, asthma, and sleep apnea (AAP, 2003; CDC, 2011a). In addition, obese children suffer from becoming a bully, being bullied themselves, and depression, all which can lead to lower self-esteem, social isolation, and poor school performance (CDC, 2011a). In addition to negative health consequences, these conditions have a significant financial impact on the health care system in the U.S. (Dietz & Wang, 2002). An obese child is two to three times more likely to be hospitalized or diagnosed with an orthopedic or mental health condition than normal weight children during childhood (Marder, 2005).

The causes of childhood obesity are multifactorial (AAP, 2003; CDC, 2011a; CDC, 2011b). Childhood obesity is the result of complex interactions between genetic, environmental, and behavioral factors. Genetic factors are the inherited traits that may predispose a child to becoming obese (McAllister et al., 2009). Environmental factors that are known to increase a child's risk for obesity are the media; the food served in school cafeterias, school vending machines, and increased portion sizes. Child behavioral factors include a lack of sleep, a lack of physical activity, consumption of more calories than are needed for the child's normal growth and development, and an increase in screen

time (AAP, 2003; CDC, 2011a). All of these are known factors that contribute to childhood obesity epidemic.

In the United States (U.S.), one group that is disproportionately affected by the obesity epidemic is low-income preschoolers. The preschool years are supposed to be the leanest years of a person's life (CDC, 2011a). A child's body mass index (BMI) actually decreases starting at the age of two, then the child's BMI levels off at its lowest point in life around the age of three, and does not start to increase again until around the age of five. However, one in seven low-income preschool-aged children in the U.S are obese (Odgen and Carroll, 2010). This number does not include the number of low-income preschoolers who are currently overweight and could be on the way to becoming obese. Even in states with the lowest obesity rates (e.g., Colorado and Connecticut) one in seven preschool-aged child is obese (Odgen and Carroll, 2010). Additionally, a child who is obese anytime during the preschool years has a five times greater chance of being obese at the age of 12 (Boles, Scharf, & Stark, 2010). For all the reasons stated above, it is of vital importance to intervene during the preschool years to prevent childhood obesity.

The most significant relationship affecting weight control behaviors for a preschool-aged child is the family. Most often it is the mother who is responsible for feeding the children in the family and the mother has the strongest influence in the eating environment. Maternal behaviors are postulated to have a strong influence in the development of a child's eating habits, food choices, food preferences, and weight control behaviors (Hughes, Power, Fisher, Mueller, & Nicklas, 2005). One of the specific behaviors believed to affect a child's body weight status is maternal feeding style. However, few studies have examined how maternal beliefs and concern about the child's

weight status affect the development of maternal behaviors. In addition, limited studies have been conducted to evaluate the relationship between maternal behaviors, such as feeding style and a child's actual weight.

### **Purpose of the Study**

The purpose of the this study was to determine the extent to which maternal beliefs and behavior regarding the child's body weight status influenced the child's actual weight beyond the known risk factors for childhood obesity. The central hypothesis of the current study was that together maternal beliefs and maternal behavior predict a child's body weight status. To test the central hypothesis and attain the goals of this research study, four specific aims were pursued.

**Specific aim one.** Determine which maternal beliefs (i.e., nutritional belief, perceptions and concerns regarding the child's weight) are most predictive of maternal behavior.

**Specific aim two.** Determine the extent to which maternal behaviors predict a child's body weight status.

**Specific aim three.** Determine the combined effect of maternal beliefs and maternal behavior on a child's body weight status.

**Specific aim four.** Determine the extent to which the relationship between maternal behaviors and the body weight status of a preschool-aged child is moderated by either the child's behavior and/or pregnancy and infancy factors known to affect a child's weight.

### Statement of the Problem

Obesity has been identified as one of the leading health concerns in the pediatric population (ages 2-18 years) in the US (CDC, 2011a; Hughes, Shewchuk, Baskin, Nicklas, & Qu, 2008). The rate of obesity among preschool-aged children (ages 3-5) has almost tripled in the past two decades (CDC, 2011a). Obese children have an increased incidence of hypertension, elevated cholesterol levels, type II diabetes, asthma, and sleep apnea (Freedman, Mei, Srinivasan, Berenson, & Dietz, 2007). The health related complications that result from childhood obesity have significant economic impact on the U.S. health care system. Medical costs to care for an obese child are three times greater than the cost of caring for a normal weight child (Marder, 2005). Maternal beliefs and behavior have a strong influence in the development of the child's eating behaviors that may lead to childhood obesity (Hughes, et al., 2005).

The early childhood environment can influence the development of the child's eating behaviors, some of which may lead to overeating and weight gain (Clark et al., 2008; Hughes et al., 2005). Along with what the child is being fed in the home, maternal nutritional belief, eating behaviors modeled by the mother, and maternal feeding styles have been identified as influential behaviors in the development of early onset childhood obesity (Clark et al., 2008).

As part of the eating environment, the behavior of feeding style has the potential to foster a young child's development of negative or unhealthy eating habits that may lead to poor self-regulation of food intake, overweight, and obesity (Scalioni et al., 2008). The habits, preferences, and eating styles of children develop, in large part, in response to paternal feeding styles, defined as "behaviors that parents use/demonstrate as they feed



their children either intentionally (as a strategy) or without consideration” (Clark et al., 2008, pg. 1030). Without intervention, these negative responses may persist throughout the child’s lifetime (Clark et al., 2008; Hughes et al., 2008; Musher-Eizenman, Holub, Hauser, & Young, 2007).

Of all the factors influencing childhood obesity, it is the behavioral factors that are most capable of being manipulated to effectively control weight and prevent obesity among children. Although genetics may be a decisive underlying factor in whether a child becomes obese, it is more practical and pragmatic to target behavioral factors such as maternal feeding style, which can be influenced on a greater scale and with less financial burden. Currently, seven studies were found to have evaluated the relationship between parental feeding styles and a child’s body weight status (Blissett and Haycraft, 2008; Brown, Ogden, Vogeles, & Gibson, 2008; Carnell and Wardle, 2007; Faith et al., 2004; Haycraft and Blissett, 2008; Hughes et al., 2008; Johannsen, Johannsen, & Specker, 2006) and two studies evaluated the relationship specifically between maternal feeding styles and a child’s body weight status (May et al., 2007; Powers, Chamberlin, Schaick, Sherman, & Whitaker, 2006). Results are mixed, with some studies finding a significant relationship between both parental feeding styles (Blissett and Haycraft, 2008; Brown et al., 2008; Haycraft and Blissett, 2008) and maternal feeding styles (May et al., 2007) and a child’s body weight status. While other studies have found no significant relationship between either parental or maternal feeding style and a child’s body weight status (Carnell and Wardle, 2007; Faith et al., 2004; Hughes et al., 2008; Johannsen et al., 2006) Powers et al., 2006).

To date, the parental behaviors of food choices and feeding styles have been studied in isolation. Researchers have studied how a single parental feeding style, such as an authoritative feeding style, influences fruit, vegetable and dairy intake in preschool-aged children (Bante, Elliott, Harrod, & Haire-Joshu, 2008; Hoerr et al., 2009; Patrick, Nicklas, Hughes, & Morales, 2005). Others have studied how the style of pressure to eat influences the quantity of food a child consumes (Fisher & Birch, 1999, Galloway, Fiorito, Francis, & Birch, 2006; Johnson & Birch, 1994; Kroller & Warschburger, 2008). Still other research has evaluated the effects of restricting specific foods and if the restriction increases the child's desire for the restricted food (Jansen, Mulkens, & Jansen, 2007; Vereecken, Keukelier, & Maes, 2004). However, none of these studies have examined how these feeding styles influence a child's body weight status. In addition, studies have not evaluated how pregnancy and infancy factors such as, overweight or obesity at the time of pregnancy (Catalano et al., 2009; Whitaker, 2004), smoking before, during, or after pregnancy (Gillman et al., 2008; Moschonis, Grammatikaki, & Manios, 2008; Olson, Strawderman, & Dennison, 2009), or a lack of breastfeeding during infancy (Karaolis-Danckert et al., 2008; Toschke et al., 2002) moderate the relationship between maternal beliefs and behavior and the child's body weight status. These issues represent significant gaps in the literature.

Another gap in the literature is the limited evidence of a guiding theoretical perspective with which to study the relationship of maternal beliefs and behavior on a child's body weight status. Previous studies have either not utilized a theoretical framework or have not made it explicit as to which theory they are utilizing to guide their studies. The current study addressed this gap in the literature by utilizing the theory of

dependent-care (Taylor & Renpenning, 2011) as a guiding theoretical framework to examine the extent to which maternal beliefs and behavior predict a child's body weight status.

In the theory of dependent-care basic conditioning factors, such as maternal age and race, influence the mother's dependent-care agency (or ability). Dependent-care agency, is then believed to, influence the dependent-care actions (behavior) that are taken by the mother to meet the needs of the socially dependent child. These dependent-care actions in turn influence a child's health outcomes. In the current study, the specific interest was on determining how maternal dependent-care agency influences maternal behavior and ultimately the child's health. In addition, pregnancy and infancy factors (e.g., smoking, BMI, breastfeeding) as well as child behaviors (e.g., activity level) were evaluated to determine how these factors moderate the relationships between maternal behavior and a child's body weight status.

The current study used a descriptive-correlational design to test the hypothesized theoretical relationships. Mother/child dyads were recruited from Oakland/Livingston the county Head Start program. Each mother was asked to complete a research packet. Each research packet contained (a) Informed Consent information, (b) a Demographic Data Sheet, (c) a Maternal Belief Survey, (b) a Caregiver Feeding Style Questionnaire, (c) a Parental Feeding Style Questionnaire, (d) a Child Activity Survey, (e) a Child and Diet Evaluation Tool and, (f) a list of dates and time the PI was available to collect the packets and answer any questions. Mothers were given a \$15.00 Speedway gift card as a 'thank you' for participating in the study. Based on a power analysis, it was anticipated that a

sample size of 127 mother/child dyads were needed to conduct the planned data analysis plan.

### **Significance**

Childhood obesity is a major health problem facing the U.S. Although different factors have been identified as contributing to this epidemic, the importance of how weight control self-care behaviors are developed in young children has received scant research attention. The proposed study has the potential to make significant contributions to the science of childhood obesity, to build nursing science, and also to provide knowledge for use in nursing clinical practice.

### **Contributions to the Science and the Discipline of Nursing**

According to Donaldson and Crowley (1978) a discipline needs a unique body of knowledge that is the science of the discipline, and also needs knowledge that is useful for practice. According to Fawcett (2005) nursing science means that the knowledge comes from the distinct nursing perspective of the nursing metaparadigm and the relationships between the concepts of humans, health, environment, and nursing. The theory of dependent-care encompasses all of Fawcett's (2005) nursing's metaparadigm concepts. Human beings are the dependent-care agents and the dependent in the theory. Health is the anticipated outcome of dependent-care (in the proposed study child weight). Environmental factors are one of the basic conditioning factors that influence the dependent-care agent and the dependent. Nursing becomes an integral part of the theory when there is a dependent-care deficit that the dependent-care agent is unable to meet.

One metaparadigm relational proposition that is reflected by the theory of dependent-care is "nursing is concerned with the activities or processes that are beneficial

to human beings” (Fawcett, 2005, p. 6). Dependent-care is undertaken to maintain life and assist with the human processes of living and dying.

Barrett (2002) further defines nursing science as “the substantive discipline specific knowledge that focuses on the human-universe-health process articulated in the nursing framework and theories” (pg. 57). When research is conducted using extant nursing theories and frameworks then the knowledge obtained builds the unique science of the discipline. Results from the proposed study will add to the knowledge of how self-care is developed, expand knowledge of dependent-care, and provide a test of the hypothesized relationships in the theory of dependent-care. Not only will results provide further evidence for effectiveness and value of the theory of dependent-care, but the quantification of maternal feeding styles and the evaluation of basic conditioning factors, dependent-care agency, and dependent-care will provide critical information regarding the association between maternal dependent-care and obesity in the preschool-aged child. As such, results from the proposed study also have the potential to provide important information for use in clinical practice.

The study is expected to build the knowledge needed for professional practice by yielding the following outcomes. First, an increased understanding of the relationship between maternal beliefs, maternal behavior, and a child’s body weight status can lead to the development of family-focused interventions. Helping mothers develop healthy weight control behaviors to utilize with the child may help in decreasing the number of overweight or obese preschoolers.

Second, the results of the study may lead to a change in the way a diet history is obtained during a routine physical examination. The primary care provider will continue

to focus on the food a child eats, but could additionally focus on how the child is fed in the home. In addition, an increased understanding of the possible relationship between feeding style and a child's body weight status could lead to a change in nutritional anticipatory guidance from focusing only on foods the child should eat to including how the child should be fed to develop healthy eating habits.

Third, it is expected that at least one of the pregnancy and infancy factors examined will moderate the relationship between maternal feeding style and a child's body weight status. This information will increase knowledge about childhood obesity and lead to early prevention. Knowledge of how these pregnancy and infancy factors influence a child's body weight status will lead to teaching about early onset childhood obesity when the mother first begins to think about becoming pregnant rather than waiting until the child is three or four years old. A maternal understanding of her role in her child's risk for early onset obesity may help to decrease the preschool obesity epidemic in the U.S.

It is expected that the proposed study will contribute to the discipline of nursing by studying childhood obesity from a nursing perspective. From its perspective "nurses study the health of humans understanding humans are in constant interaction with their environment" (Donaldson & Crowley, 1978, p. 119). The proposed study evaluates the child's health in relationship to the beliefs and behaviors demonstrated by the mother creating the interaction between the mother and the child in the eating environment.

### **Summary**

Pediatric obesity, specifically in the preschool-aged child, has become one of the country's leading health concerns. The study will utilize a descriptive-correlational

design to study maternal influences on the child's body weight status. The theory of dependent-care will be utilized as a guiding theoretical framework. It is expected that the results of the proposed study will add to the practice knowledge of nursing and to the knowledge that is nursing science, thereby making significant contributions to the discipline of nursing.

## CHAPTER 2

### Background

Childhood obesity is a worldwide epidemic affecting children as young as two years of age. Among children in the United States, the prevalence of obesity has tripled from the previous generation. Obesity is currently one of the country's leading pediatric health concerns (AAP, 2003; CDC, 2011a). The causes of childhood obesity are multifactorial and include genetic, environmental, and behavioral factors (AAP, 2003; CDC, 2011a). Obese children have been shown to suffer from negative social sequelae such as depression and bullying, which can lead to lower self-esteem, social isolation, and poor school performance (CDC, 2011a). Childhood obesity also leads to an increased incidence of childhood hypertension, orthopedic complications, elevated cholesterol levels, type II diabetes, asthma, and sleep apnea (AAP, 2003; CDC, 2011a). In addition to negative health issues, childhood obesity and the related health conditions have a significant financial impact on the health care system in the U.S. (Dietz & Wang, 2002).

### Definition of Childhood Obesity and Scope of the Problem

#### Definition of Childhood Obesity

Body mass index (BMI) is widely utilized to define overweight and obesity in childhood. Childhood overweight is defined as a body mass index greater than or equal to the 85<sup>th</sup> percentile but less than the 95<sup>th</sup> percentile on the BMI-for-age and sex growth curves in children ages two to 19. Childhood obesity is defined as a body mass index equal to or greater than the 95<sup>th</sup> percentile on the BMI-for-age and sex growth curves in children and adolescents two to 19 years of age. Unlike adults where a BMI category is utilized, a child's body weight status is based on percentiles on the BMI-for-age growth



curve as children's body composition varies by age and gender. Body mass index is calculated from a child's measured height and weight and is a ratio of the child's weight in kilograms to the square of the child's height in meters (AAP, 2003; CDC, 2011a). This measure is used as a surrogate for adiposity as height and weight are easy to obtain in children and it correlates well to more accurate measures of body fatness (AAP, 2003).

### **Scope of the Problem**

Currently in the U.S. approximately 12.5 million children and adolescents are obese. The prevalence of obesity has increased in males and females, and in all socioeconomic statuses, racial and ethnic groups over the past several decades. From 1976 to 2008 obesity rates rose from 5% to 10.4% in preschool-aged children (ages 2-5 years) and from 6.5% to 19.6% in school-aged children (ages 6 to 11 years). During the same time, obesity in the adolescent population (ages 12-19) rose from 5% to 18.1% (CDC, 2011a).

While obesity has dramatically increased in children and adolescents, there are significant differences in prevalence among racial backgrounds, age groups, and socioeconomic status (AAP, 2003; CDC, 2011a). For example, between NHANES (National Health and Nutrition Examination Survey) III and NHANES IV the prevalence of obesity for non-Hispanic White males rose from 11.6% to 16.7%. In that same time period there was a larger increase in obesity for non-Hispanic Black adolescent males from 10.7% to 19.8%. An even larger increase was seen among adolescent Hispanic males, with a rise in obesity from 14.1% to 26.8% (Odgen, Carroll, Curtin, Lamb, & Flegal, 2010).

A similar disparity is true for female minority adolescents between NHAHES III and NHANES IV. Among females, non-Hispanic Black adolescent were more likely to be obese than non-Hispanic White adolescents (29.2% vs. 14.5%). Among non-Hispanic White females between NHANES III and NHANES IV the obesity rate only increased from 8.9% to 14.5%. However, among non-Hispanic Black females the prevalence of obesity increased from 16.3% to 29.2% (Odgen et al., 2010).

Another group that is disproportionately affected by obesity is low-income preschool-aged children. Currently in the U.S., one in seven low-income preschoolers are obese. In ten years, from 1998 to 2008, the overall prevalence of obesity among low-income preschoolers increased from 12.4% to 14.5%. The prevalence of obesity for low-income preschoolers in all 50 states ranged from 9.4% (Colorado) to 19% (Virginia) (CDC, 2011). Even in the states with the lowest overall childhood obesity rates in the country, the low-income preschoolers rates of obesity are high. In addition, in 2008 the prevalence of obesity in low-income American Indian/Alaskan Native preschool-aged children was 21.2% while 18.5% of low-income Hispanic preschool-aged children were obese (Odgen and Carroll, 2010). These numbers for children in a lower socioeconomic status are higher than the national average and represent a significant health risk for minority children. While the increase in obesity in preschoolers may not seem to be as dramatic as some other groups, these children remain a priority as the earlier obesity starts in a person's life the more likely the person is to have severe obesity in adulthood (CDC, 2011). A preschooler who is equal to or above the 95<sup>th</sup> percentile on the BMI-for-age growth curve before the age of five, has a five times greater chance of being obese at

the age of 12 than a preschooler who never reached the 95<sup>th</sup> percentile on the BMI-for-age growth curve (Boles et al., 2010).

### **Consequences of Childhood Obesity**

There are many consequences of childhood obesity, some of which continue into adulthood. Obese children are at risk for negative social, physical, and mental health outcomes due to their body weight status. In addition, there are economic consequences of childhood obesity affecting not just the child's family, but also the U.S. healthcare delivery system.

#### **Social Consequences**

One of the major social consequences of childhood obesity is the risk the child is placed at for social isolation, depression, bullying, and psychosocial problems (BeLue, Francis, & Colaco, 2009; CDC, 2011a; Storch et al., 2007). In recent studies both overweight and obese Caucasian and Hispanic youth between the ages of 12 and 17 were more likely to report feelings of worthlessness or feeling inferior. Obese adolescents were significantly more likely to report feelings of depression or anxiety (BeLue et al., 2009; Everson, Maty, Lynch, & Kaplan, 2002; Sjoberg, Nilsson, & Leppert, 2005). In addition, these obese children had more behavior problems and bullying of others than their non-obese counterparts (BeLue et al., 2009; Janssen, Craig, Boyce, & Pickett, 2004). Janssen and colleagues (2004) found that obese 15 and 16-year-old males and females were more likely to perpetrate bullying than their normal weight counterparts. Additionally, obese children of any age are more likely to experience social isolation, poor school performance, and poor self-image (Caprio et al., 2008; CDC, 2011a). These feelings of

social isolation, low self-esteem, and depression can persist into adulthood (CDC, 2011a).

In addition to depression, anxiety, and social isolation, the obese child is at risk for being bullied. In a recent study, 15 and 16-year-old obese males were found to not only be the perpetrators of bullying but were likely to be bullied themselves (Janssen et al., 2004). Farhat and colleagues found that obese adolescent females, ages 11-17, were more likely to be bullied as well as be the perpetrators of bullying (Farhat, Iannotti, & Simmons-Morton, 2010). Overall however, obese children are more likely to be the victims of bullying (Baum & Forehand, 1984; Janssen et al., 2004; Lumeng et al., 2010; Pearce, Boergers, & Prinstein, 2002). Obese younger children (ages 8-11) were found to be almost two times more likely to be bullied than their non-obese counterparts. The odds of the obese child being bullied held true regardless of socioeconomic status, race, gender, social skills, or school achievement (Lumeng et al., 2010). This remained true in children ages 11-16 (Janssen et al., 2004).

The types of bullying varied among obese adolescents. Both obese male and female adolescents were more likely to suffer from verbal bullying than their non-obese counterparts. These obese adolescents were called names, made fun of, or teased (Janssen et al., 2004). However, only obese females were more likely to suffer from physical forms of bullying. These females suffered from being the victims of aggression ranging from pushing to fights. However, there was no significant association between obesity and physical bullying in males. Lastly, there was no significant association between obesity and sexual harassment in either gender or any age group (Janssen et al., 2004).

## Health Consequences

Obese children can potentially suffer from many health consequences such as orthopedic problems, obstructive sleep apnea, type II diabetes, high blood pressure, high cholesterol, asthma, fatty liver, gallstones, and gastro-esophageal reflux (AAP, 2003; CDC, 2011a). In addition, obese children are more likely to become obese adults and develop the health consequences that are associated with adult obesity. Obese children are more likely to suffer from musculoskeletal pain and fractures more often than their non-obese counterparts (Marder, 2005; Taylor et al., 2006). Obese children reported more frequent knee pain and greater impairment in mobility than children who were not obese (Taylor et al., 2006). Lastly, obese children are more likely to suffer from genu varum (bow-leggedness) and slipped capital femoral epiphysis (AAP, 2003).

In addition to orthopedic problems, obese children suffer from problems with the endocrine system such as insulin resistance, hyperinsulinism, type II diabetes, impaired glucose tolerance, and menstrual irregularities (AAP, 2003; CDC, 2011a, Dietz, 1998). While the prevalence of type II Diabetes in childhood is still low, it is on the rise due the increased prevalence of childhood obesity (Caprio et al., 2008). One risk factor for type II diabetes is impaired fasting glucose. Impaired fasting glucose was found in 7% of non-Hispanic White adolescents, 4% of non-Hispanic Black adolescents, and 13% of Mexican American adolescents (Williams et al., 2005). Type II diabetes in obese children varies among racial/ethnic groups (Caprio et al., 2008). Clese and colleagues (2006) found that among 10 to 19 year olds the proportion of diabetes diagnosed as type II was 22% for Hispanics, 33% for non-Hispanic Blacks, 40% for Asian/Pacific Islanders, and 76% for Native Americans, but only 6% for non-Hispanic Whites.

While obese children have an increased risk of developing endocrine consequences, they are also at risk for increased cardiovascular risk factors. These include hypertension, dyslipidemia, and hypercholesterolemia (AAP, 2003; Caprio et al., 2008; CDC, 2011a, Dietz, 1998). Hypertension in childhood and adolescence is on the rise as the prevalence of childhood obesity increases (CDC, 2011b, Dietz, 1998). In a landmark study, Bogalusa Heart Study, it was found that among the older children (ages 11-17) females had higher levels of LDL cholesterol, triglycerides, insulin, and diastolic blood pressure. Twenty-six percent of the children had one risk factor for cardiovascular disease and 4% had three or more cardiovascular risk factors. In the longitudinal arm of the study, when childhood BMI-for-age to adult BMI was examined, it was found that 84% of the children with a BMI-for-age that plotted between the 95<sup>th</sup> and 99<sup>th</sup> percentile became obese adults. For those children with a BMI-for-age plotted greater than the 99<sup>th</sup> percentile, 100% became obese adults (Freedman et al., 2007).

In addition to health consequences, obesity can lead to health-risk behaviors with obese children being found to have more health-risk behaviors than non-obese children. Obese females were found to participate in several substance risk-taking behaviors compared to their non-obese counterparts. Obese females were found to have a greater relative risk of using cannabis, drinking alcohol, and smoking cigarettes. However, cannabis use was only seen in the younger females. The younger obese females used cannabis three times more when compared to younger non-obese females. The association with these risk behaviors was not seen with obese adolescent males. However, compared to normal weight males, obese males were more likely to carry a weapon (Farhat et al., 2010).

## **Economic Consequences**

The health-related complications that result from childhood obesity have a significant economic impact on the U.S. health care system. The disparities in the prevalence of obesity are reflected in the economic impact on the U.S. health care system. Currently, low-income children are six times more likely to have a diagnosis of obesity than a child who has private insurance. Adding to the economic burden for the U.S., obese children are two to three times more likely to be hospitalized or be diagnosed with an orthopedic or mental health problem. These conditions add to the short term medical costs, increasing the burden on the U.S. economic system. Obese children are more likely to be diagnosed with a cardiovascular or endocrine disorder, which will continue to add to the economic costs of treating childhood obesity (Marder, 2005). In addition to the economic impact, the dramatic increase in the incidence and prevalence of childhood obesity has had significant effects on the entire health care system in the U.S., including research funding expenditures, financial exhaustion, and resource allocation and consumption (Dietz & Wang, 2002).

### **Etiological Factors Influencing Childhood Obesity**

Childhood obesity is a complex disease resulting from multiple closely intertwined causal factors. Important key factors include a genetic predisposition, factors that affect a child's caloric balance (e.g., portion sizes, activity), sleep, and maternal behaviors during pregnancy and infancy.

#### **Genetic Factors**

Genetic factors refer to the inherited traits that may predispose a child to becoming obese (e.g., a slow metabolism). Although genes frequently play a role in

obesity, rarely do genes alone predict future health. A child's genetic predisposition to obesity often becomes provoked and exacerbated with exposure to particular environmental and behavioral factors. Many children will be exposed to the same environmental and behavioral factors, however, only some will develop childhood obesity. Given this difference in responses to potentially risky environmental and behavioral factors, it is clear that the unique genetic predisposition of each child can play an important role in determining susceptibility to obesity (CDC, 2011a).

### **Caloric Balance**

Childhood obesity is a complex disease resulting from multiple closely intertwined causal factors. At the metabolic level, it is the result of an imbalance between the calories a child consumes, the calories expended, and the calories needed to support normal growth and development. When calories consumed are greater than the calories expended for normal growth and development, overweight (a BMI-for-age between the 85<sup>th</sup> and 94<sup>th</sup> percentile) and obesity are the outcome (CDC, 2011a). Adding to this caloric imbalance is the influence of school food programs and the increase in food portion sizes in the U.S.

**School food.** Around 55 million children in the U.S. spend a large part of their day at school. Many of these children eat not only lunch, but also breakfast at school (Snyder, Dillow, & Hoffman, 2009). Children have access to unhealthy food choices and sugary drinks all day through vending machines and the school cafeteria. In addition, school parties and social events increase a child or adolescent's access to these unhealthy foods and drinks (CDC, 2011a). The end result is often an increase in calories consumed.



**Portion size.** Portion sizes are influencing the childhood obesity epidemic. Not only have portion sizes increased in restaurants, but portion sizes have increased in vending machine snacks and snacks sold in the grocery store even come in larger sizes. Mothers can now buy the “super size” bag of chips or snacks. Often restaurants that have increased their portion sizes have done so by offering foods that are high in calories and fat but low in nutritional value (CDC, 2011a). With the increased portion sizes that are now served in restaurants and at home, children are consuming more calories without even being aware of it (Fisher, Rolls, & Birch, 2003; McConahy, Smiciklas-Wright, Mitchell, & Picciano, 2004). This leads to more calories being consumed than needed for normal growth and development.

**Physical activity.** Obesity occurs as a result of increased caloric intake and a decreased level of physical activity (CDC, 2011a). Many children in the U.S. fall short of the recommended daily 60 minutes of vigorous physical activity three days per week. The children also fall short of three days a week of bone strengthening and muscle building activities (CDC, 2011a). According to the United States Department of Health and Human Services (2008) only 18% of high school-aged students met the requirement of 60 minutes of physical activity. Physical education classes have been removed from many school curricula in the U.S., which further decreases a child’s physical activity level. Only 33% of students in the U.S attended daily physical education classes (CDC, 2011a).

There are environmental factors contributing to a lack of physical exercise in children and adolescents in the U.S. Currently many new communities are built in ways that make it unsafe to encourage physical activity. Many newer subdivisions do not have

sidewalks, which would require children to walk or ride their bikes in the street. In other communities it is simply not safe for children to be outside and be physically active. Parks and recreation areas may be available in some communities, but these may be difficult places for the child to get to and participate in physical activity. Lastly, for many children there is not even a safe route in which they can use to walk to school (CDC, 2011a).

**Screen time and the media.** In addition to a lack of physical activity, children are becoming more sedentary, contributing to obesity. Children in the U.S. spend more than 25% of their waking time viewing television, playing video games, or playing on the computer (Robinson, 2001). In a randomized controlled trial, Robinson grouped children into an intervention group with decreased screen time and a control group whose screen time was not changed. Results showed that when television time was decreased, without a specific intervention to increase physical activity, BMI was significantly lower in the intervention group than the control group (Robinson, 2001).

Time in front of the television or other forms of screen media may lead to obesity in several ways. First, while a child or adolescent is in front of any screen they are less physically active. Besides occupying the time the child could be spending engaged in physical activity, the television influences childhood obesity by exposing children to a multitude of advertisements that encourage unhealthy food choices and increased portion sizes (Robinson, 2001; Zimmerman & Bell, 2010). On the television and radio, in the newspaper, and other forms of media unhealthy foods are promoted in advertisements specifically targeted at children (CDC, 2011a). Currently, advertising unhealthy food choices is permitted in almost half of the middle schools and high schools in the U.S. on

posters or bulletin boards throughout the school and at sporting events (CDC, 2011a). The media promotes food high in fat, sugar, calories, and sodium and low in nutritional value. However, the same media very rarely promotes healthy eating and healthy foods (Institute of Medicine, 2005). In this way children may be influenced by the media to make unhealthy food choices. In addition, children tend to consume more calories than they need for normal growth and development by snacking on a wide variety of foods and eating meals while watching television. Lastly, television viewing by children or adolescents late at night may interfere with sleep, which is another known risk factor for childhood obesity (CDC, 2011a).

### **Sleep**

Lack of sleep may have the most significant impact on weight in children and adolescents (Taheri, 2006). While Lumeng and colleagues (2007) studied the association between sleep duration and overweight, not obesity, significant relationships were found. Shorter sleep durations in third and sixth grades were significantly associated with being overweight in the sixth grade. A child had a 40% less chance of being overweight in the sixth grade for every additional hour of sleep the child got in the third grade (Lumeng et al., 2007). In a 32-year longitudinal study evaluating the relationship between childhood sleep duration and adult obesity, shorter sleep duration was found to be associated with increased adult BMI at the age of 32. The relationship between shorter sleep duration and increased BMI in adulthood remained significant after controlling for parental BMI, adult sleep time, socioeconomic status, parental control in childhood, television viewing, physical activity level, and early childhood BMI (Landhuis, Poulton, Welch, & Hancox, 2008). Studies within and outside the U.S. in children and adolescents ages three to 16

have found significant relationships between shorter sleep duration and increased BMI (Locard et al., 1992; Marshall, Biddle, Gorely, Cameron, & Murdey, 2004; Sugimori et al., 2004; von Kries, Toschke, Wurmser, Sauerwald, & Koletzko, 2002). Lastly, shorter sleep duration as early as the age of 30 months was shown to be predictive of obesity at the age of seven (Reilly et al., 2005).

### **Pregnancy and Infancy Factors Influencing Childhood Obesity**

Currently, a pregnancy and infancy factor for childhood obesity is maternal overweight and obesity during pregnancy (Catalano et al., 2009; Whitaker, 2004). One infancy factor is choosing not to breast feed, as breastfeeding during infancy has been shown to be protective against early childhood obesity (Karaolis-Danckert et al., 2008; Toschke et al., 2002). Lastly, maternal smoking before, during, or after pregnancy has also been shown to be a risk factor for early childhood obesity (Gillman et al., 2008; Moschonis et al., 2008; Olson et al., 2009).

### **Maternal Overweight and Obesity at the Time of Pregnancy.**

Maternal obesity at the time of pregnancy has been shown to significantly increase a child's risk for obesity (Catalano et al., 2009; Kitsantas, Pawlowski, & Gaffney, 2010; Olson et al., 2009; Whitaker, 2004). In one study, 24% of the population of low-income children was overweight by the age of four if the child's mother was obese at the time of pregnancy (Whitaker, 2004). In both Hispanic and non-Hispanic White populations, children whose mothers were overweight or obese at the time of pregnancy were at least 1.5 times more likely to be overweight during the preschool years (Kitsantas et al., 2010).

A mother's weight at the time of pregnancy has been shown to be a significant risk factor for childhood overweight or obesity. Additionally, there is an association between maternal weight gain during pregnancy in obese women and obesity in the preschool-aged child. Mothers who were obese at the time of pregnancy and gained more than the recommended amount of weight during pregnancy had a six-fold increase in the risk of having a child who was overweight or obese at the age of three. However, there was no significant relationship between maternal weight gain and childhood overweight or obesity for mothers who had a normal BMI at the time of pregnancy (Olson et al., 2009).

### **Breastfeeding**

An pregnancy and infancy factor contributing to overweight or obesity in the preschool-aged child is a lack of breastfeeding during the infancy period (CDC, 2011a; Toschke et al., 2002; Karaolis-Danckert et al., 2008). Infants who are bottle-fed have been shown to have three times greater risk of rapid weight gain through the age of three (Karaolis-Danckert et al., 2008). Studies have shown that babies who were bottle-fed weighed more than breastfed babies as early as three months of age (Bergmann et al., 2003) while infants who were exclusively breastfed were less likely to be overweight or obese at the ages of six and 12 months (Moschonis et al., 2008). In one study of bottle-fed children, the rate of overweight or obesity by age four was double that of babies who were breastfed, and that rate tripled by the age of six (Bergmann et al., 2003). The relationship between bottle-feeding and childhood obesity was significant even after controlling for parental education, parental obesity, maternal smoking, high birth weight,

daily television watching greater than one hour per day, having siblings, and physical activity (Toschke, et al., 2002).

### **Maternal Smoking**

Maternal smoking has been shown to be another risk factor for childhood obesity. Children born to mothers who were active and passive smokers during pregnancy were almost two times more likely to be obese than those not exposed to smoking during pregnancy (Kitsantas et al., 2010; Moschonis et al., 2008). Oken (2008) found that children who were exposed to smoke during pregnancy were at greater risk for being overweight or obese from the age of three to 33 (Oken, Levitan, & Gillman, 2008).

While many studies have found exposure to prenatal smoking was a risk factor for increased weight in preschoolers, (Adams, Harvey, & Prince, 2005; Blake et al., 2000; Chen, Pennell, Klebanoff, Rogan, & Longnecker, 2006; Fried, James, & Watkinson, 2001; Jones, Riley, & Dwyer, 1999; Oken, Huh, Taveras, Rich-Edwards, & Gillman, 2005; Naeye, 1981; Vik, Jacobsen, Vatten, & Bakketeig, 1996) results are mixed as to whether or not exposure to smoking in the prenatal period affects a child's height. Several studies that found prenatal smoke exposure affects a child's weight also found that exposure to smoke prenatally did not affect the child's height (Adams et al., 2005; Fried et al., 2001; Oken et al., 2005). However, several of the other studies found that prenatal exposure to smoke was a risk factor for increased weight in preschool-aged children additionally found that exposure to prenatal smoke led to these children also being shorter (Blake et al., 2000; Chen et al., 2006; Jones et al., 1999; Naeye, 1981; Vik, et al., 1996). Research has also shown that maternal smoking throughout pregnancy poses a greater risk for overweight and obesity in childhood than smoking only in the early

stages of pregnancy (Chen, et al., 2006; Leary et al., 2006; Power & Jefferis, 2002; Stroup et al., 2000; Toschke, Montgomery, Pfeiffer, & von Kries, 2003). A study by Oken and colleagues (2008) found that smokers were very different from non-smokers in several ways that increases a child's risk for early onset obesity. The smokers tended to have a lower income, be less educated, heavier, less likely to breast feed, had children who had rapid weight gain in infancy, and tended to be less physically active.

### **Early Onset Childhood Obesity**

Although childhood obesity is a serious problem at any age, obesity in the preschool-aged child is of special concern. Early onset of childhood obesity (i.e., younger than five years of age) increases the risk for obesity to persist and worsen into adulthood, and also increases the risk of associated health issues such as heart disease, joint problems, and mental stress (CDC, 2011a). To help prevent obesity in later childhood, adolescence, and the adult years one must intervene during the preschool years. Around the age of three, children stop eating from deprivation and start eating based on how they are socialized to food and to eating behaviors (Klesges, Stein, Eck, Isbell, & Klesges, 1991; Koivisto, Fellenius, & Sjoden, 1994). The early home mealtime environment has a strong influence on the development of a child's eating habits, food choices, and food preferences. Although both parents provide the eating environment for their preschool-aged child, mothers have the strongest influence over that environment. The eating environment, which encompasses parental eating habits and beliefs, (Scaglioni, Salvioni, & Galimberti, 2008) strongly influence how children are socialized with respect to the development of eating behaviors. Therefore, the home environment has been identified as

perhaps the most influential environmental factor in regard to childhood obesity (Clark et al., 2008; Hughes et al., 2005).

### **Maternal Beliefs**

The beliefs and behaviors of the mother within the home environment are influential in the development of childhood obesity. In the home environment the mother is often the one who is responsible for the feeding environment and has the most influence in a young child's developing eating habits and preferences. Therefore, it is important to examine the effect of maternal beliefs on the development of obesity in pre-school aged children. However, most of the current literature focuses on 'parents' rather than examining the specific influence of mothers.

**Nutritional belief.** The American Academy of Pediatrics recommends at each well-child examination the primary care provider provide parents with nutritional education in regards to a healthy diet, portion sizes, healthy snacks, and the daily-recommended amounts of milk and juice. Nutritional guidance is considered of extreme importance during the preschool years when lifelong habits are forming (Woolford, Clark, Lumeng, Williams, & Davis, 2007). However, in a recent qualitative study with mothers of preschool-aged children less than half of the mothers reported that nutrition was even discussed during the well-child examination. Those mothers, who reported that nutrition was discussed, stated the discussion focused on questions about the child's diet as opposed to nutritional education (Woolford et al., 2007).

In addition to well-child examinations, nutritional education is provided every three months to all mothers who participate in the Women, Infants, and Children Supplemental Feeding Program (WIC). Mothers are taught the following



recommendations for serving sizes of each food group. A three year old should have three servings of whole grains, four servings of milk and dairy, and two servings each of protein, fruit, and vegetables a day. A four and five year old should have four servings of whole grains, 4 servings of milk, three to four servings of protein, two to three servings of fruit, and 3 vegetable servings a day. The number of servings for a three year old was calculated based the recommendations for a three year old. Number of servings for a four and five year olds was calculated based on the minimum recommendations for four and five year olds.

In a recent study conducted with mothers enrolled in WIC, the mothers' nutritional knowledge recall was good as the average score on the 17-item test was 89%, with 59% of the participants scoring 100% (Obeidat, Shriver, & Roman-Shriver, 2010). However, nutritional education does not necessarily translate to what is practiced in the home. In another study of mothers of preschool-aged children enrolled in WIC, 79% of the children drank flavored, whole, or 2% milk, while the WIC teaching recommends skim milk for the preschool-aged child. Additionally, it is recommended that the child consumes no more than four to six ounces of juice per day and the participants reported that the children had two or more servings per day. Fruits and vegetable consumption for the participants was less than recommended for the preschool-aged child, averaging only one serving of fruit or vegetable daily. Forty percent of the children snacked on chips, cookies, or candy at least once per day. At the age of two, 44% of the children were drinking at least one soda pop per day and by the age of four, 57% of the children were drinking at least one soda pop per day (Nelson, Carpenter, & Chaisson, 2006).

**Beliefs about child's weight status.** Recent studies have shown that parents incorrectly perceived their child's body weight status as normal 64%-98% of the time when the child was actually obese (Carnell, Edwards, Croker, Boniface, & Wardle, 2005; Reifsnider et al., 2006). However, only a limited number of studies have been conducted to examine the factors that influence those perceptions (Baughcum, Chamberlin, Deeks, Powers, & Whitaker, 2000; Carnell et al., 2005; Eckstein et al., 2006; Harnack et al., 2009; He & Evans, 2007; Maynard, Galuska, Blanck, & Serdula, 2003). In children less than six years of age, Carnell and colleagues (2005) found the odds of parental perceptions being correct were increased when the child was overweight or obese. Baughcum and colleagues (2000) measured seven factors of influence and found that mothers with a high school education or less were six times more likely to have an incorrect perception of their child's weight status. Another study found that parents who were older were less likely to incorrectly perceive the child's weight status; however, the result was not statistically significant (Harnack et al., 2009).

Mixed results were found in parents of children older than 6 years of age. He and Evans (2007) found that parents of females, parents who were white, and mothers with a normal BMI were more likely to correctly perceive weight status in their children. In contrast, Maynard and colleagues (2003) found maternal BMI and race/ethnicity were not significant predictors of the accuracy of parents' perceptions of their child's weight. However, the younger the child, the less likely mothers were to correctly identify the child as overweight regardless of any predictors.

Eckstein and colleagues (2006) evaluated factors that influenced correct perception of childhood weight status by parents using both pictures and words. When

parents of children less than six years old were asked to evaluate the child's weight status using just word descriptions, correct perception was low. Therefore, the researchers chose to analyze only picture perceptions of weight status. Eckstein and colleagues found none of the factors evaluated (doctor concern, perception that their child is less active than others, child's gender, child's BMI group, parental education, ethnicity, and illness in a parent or grandparent) to be significant in influencing correct perception of the child's weight status when using pictures (Eckstein et al., 2006). While some studies showed the younger the child the less likely mothers were to identify them as overweight regardless of any predictors (Maynard, et al., 2003), other studies have demonstrated the odds of parental perceptions being correct in a younger child were increased if the parents were older, or when the child was overweight or obese (Carnell et al., 2005; Harnack et al., 2009).

**Concern about weight status.** In addition to beliefs about a child's body weight status, maternal concern about a child's weight has been studied to determine if concern is related to feeding style. Currently, maternal concerns about a child's weight and feeding styles have been studied in relationship to only a limited number of feeding styles. Recent studies found that mothers who were concerned about their child's weight or concerned the child would become overweight were more likely to utilize a restrictive feeding style (Crouch, O'Dea, & Battisti, 2007; Gregory, Paxton, & Brozovic, 2010; May et al., 2007; Webber, Hill, Cooke, Carnell, & Wardle, 2010). However, restriction was defined differently in different studies. For example, May and colleagues (2007) found mothers who were concerned their child would become overweight restricted sweets, junk food, and the child's favorite foods while other studies did not specify the types of

food the child was restricted from eating (Crouch et al., 2007). Mothers who were concerned their children may become overweight were less likely to use the pressure to eat feeding style (Keller, Pietrobelli, Johnson, & Faith, 2006; May et al., 2007; Webber et al., 2010). Conversely, mothers who were concerned their child was underweight were found to utilize a pressure to eat feeding style (Gregory et al., 2010). Regardless of the feeding style employed, maternal concerns about a child's weight were not found to be significantly associated with monitoring or modeling healthy eating patterns, which have been shown to have a positive influence on a child's overall weight status (Gregory et al., 2010; Webber et al., 2010).

### **Maternal Behavior and a Child's BMI**

Parental feeding styles have been identified as an influential behavioral factor in the home that affects a child's weight (Clark et al., 2008). The habits, preferences, and eating styles of children develop, in large part, in response to parental feeding styles. Without intervention, these responses may persist throughout a child's lifetime (Clark et al., 2008; Hughes et al., 2008; Musher-Eizenman et al., 2007). Parental feeding style is defined as "behaviors that parents use/demonstrate as they feed their children either intentionally (as a strategy) or without consideration" (Clark et al., 2008, pg. 1030). The definition focuses on the behaviors of parental feeding and not the food itself. However, it has been shown that mothers have the strongest influence on a preschool-aged child developing eating habits and patterns. Therefore, the definition of maternal feeding style will be consistent with Clark and colleagues (2008), with the focus on mothers instead of parents. However, since much of the literature is about 'parents' wherever it is specific to mothers is indicated in the following text.

### **The importance of examining maternal feeding styles**

Of all the factors influencing childhood obesity, it is the environmental and behavioral factors that are most capable of being manipulated to effectively control weight and prevent obesity among children (CDC, 2011a). Although genetics may be a decisive underlying factor in whether or not a child becomes obese, it is more practical and pragmatic to target environmental and behavioral factors, which can be influenced on a greater scale and with less financial burden.

The early childhood environment can influence the development of the child's eating behaviors, some of which may lead to overeating and weight gain as the young child develops (Clark et al., 2008). Along with what the child is being fed in the home, a mother's nutritional belief, and the behavior modeled by the mother, and maternal feeding styles have also been identified as influential behaviors (Clark et al., 2008). Mothers have the strongest influence over a young child's eating environment. As part of the eating environment, maternal feeding style has the potential to foster a young child's development of unhealthy eating habits that may lead to poor self-regulation of food intake, overweight, and obesity (Scaglioni et al., 2008). Maternal feeding styles may be influenced by maternal beliefs and concern about her child's weight.

**Feeding styles.** Maternal beliefs influence maternal behavior, which in turn influences a child's body weight status. A recent review of the literature found mixed results in studies that evaluated the relationship between feeding styles and a child's body weight status (Blissett & Haycraft, 2008; Brown et al., 2008; Carnell & Wardle, 2007; Faith et al., 2004; Haycraft and Blissett, 2008; Hughes et al., 2008; Johannsen et al., 2006; May et al., 2007; Powers et al., 2006). Some studies found a significant

relationship between parental feeding styles and a child's BMI (Carnell & Wardle, 2007; Hughes et al., 2008; Johannsen et al., 2006) and a significant relationship between maternal feeding style and child's BMI (Powers et al., 2006). Other studies did not find a significant relationship between parental feeding styles and a child's BMI (Blissett & Haycraft, 2008; Brown et al., 2008; Haycraft & Blissett, 2008) or a significant relationship between maternal feeding style and a child's BMI (May et al., 2007). Studies found that maternal pressure to eat (Powers et al., 2006) and parental pressure to eat (Carnell & Wardle, 2007) exhibited a significant inverse correlation to a child's BMI. In one of the studies that included fathers, Johannsen, and colleagues (2006) determined that daughters of fathers who utilized a restrictive or controlling feeding style had a higher percentage of body fat. Finally, Hughes and colleagues (2008) found that in a low-income sample, an indulgent feeding style (i.e., a parent who allows the child to eat whatever the child wants) was significantly correlated to a child having an increased BMI. The positive association was so strong it remained significant even after controlling for child's gender, age, and ethnicity, as well as parent BMI, level of education, age, and affect (Hughes et al., 2008).

In contrast to the cross-sectional studies discussed above Faith and colleagues (2004) conducted a longitudinal study evaluating parental attitudes and feeding styles related to child's BMI. Fifty-seven families participated in the study as part of a larger Infant Growth Study. The children in the study were classified as either low or high-risk for obesity based on the mother's pre-pregnancy weight. A child was considered low-risk for obesity if the mother's pre-pregnancy weight was less than the 33<sup>rd</sup> percentile. A child was considered high-risk for obesity if the mother's pre-pregnancy weight was greater

than the 66<sup>th</sup> percentile.

Faith and colleagues (2004) reported several key findings from their study. First, parental feeding attitudes (child weight concern, perceived child weight, and perceived responsibility for feeding the child) and parental feeding styles (pressure to eat and restriction) remained stable over a two-year period. While parental feeding attitudes, and styles remained stable over the two-year period there were other differences between the low-risk for childhood obesity and high-risk for childhood obesity groups. The parental attitude of concern about a child's weight was associated cross-sectionally and prospectively in only the group at high-risk for obesity. In regard to parental feeding styles, there were also differences between the low-risk for obesity and high-risk for obesity groups. In the low-risk group, a parental feeding style of monitoring fat intake predicted a reduced BMI z-score at age 7. This however did not hold true for the high-risk for obesity group. Lastly, among the high-risk for obesity group the parental feeding style of restriction predicted a higher BMI z-score two years later. This remained significant even when the researchers controlled for the child's BMI at age 3 (Faith et al, 2004)

### **Limitations of Current Research**

The studies presented above provide insight into the relationship between parental behaviors and a child's body weight status; however, there are limitations to the body of work. Common to many of the studies were limitations in the methods in which instruments were utilized. For example, three studies utilized a questionnaire that had only been used in pilot tests where reliability and validity had not been established (Baughcum et al., 2000; Eckstein et al., 2006; He & Evans, 2007). One study provided

limited information regarding the questionnaires used to measure parental perception of a child's weight so that reliability and validity could not be determined (Harmack et al., 2009).

Other limitations concerned the methods in which the questionnaires were utilized. The majority of the feeding style studies utilized the Child Feeding Questionnaire but only evaluated the parental feeding styles of restriction and pressure to eat, while the parental feeding style of monitoring was not evaluated (Blissett and Haycraft, 2008; Brown et al., 2008; Carnell & Wardle, 2007; Faith et al., 2004; Haycraft and Blissett, 2008; Johannsen et al., 2006; May et al., 2007; Powers et al., 2006). Some studies only utilized specific questions under each subscale of the questionnaire to analyze parental feeding styles (Brown et al., 2008; Haycraft and Blissett, 2008; Johannsen et al., 2006; May et al., 2007) or combined the questions together (Crouch et al., 2007; Johansson et al., 2006). In addition, some studies changed the responses on the questionnaire (May et al., 2007) or combined the feeding styles of restriction and pressure to eat to evaluate the concept of "control" (Johansson et al., 2006). Crouch and colleagues (2007) combined parents who were concerned about the child's weight with parents who were concerned the child would become overweight in the future to assess control over eating. Finally, one study utilized only one question to assess whether parents were currently concerned about the child's weight or if the parent was concerned the child would become overweight, making it difficult for the researchers to distinguish between the two types of concern (Webber et al., 2010).

While many of the limitations surround the use of questionnaires, other limitations exist in regard to study design and sample. For example, two studies did not



use a standardized protocol for obtaining heights and weights of children (Baughcum et al., 2000; Eckstein et al., 2006). In both studies, data was collected at multiple sites with researchers relying on staff at each clinic to obtain measurements of height and weight. Lastly, He and Evans (2007) only had complete data on 46% of the parent-child pairs. In addition, two of the studies lacked diversity in their population samples leaving the authors unable to explore racial or ethnic differences (Crouch, et al., 2007; Gregory et al., 2010).

The final limitation was that few studies utilized a guiding theoretical framework, or if a theoretical framework was used it was not made explicit (Baughcum et al., 2000; Blissett and Haycraft, 2008; Brown et al, 2008; Carnell & Wardle, 2007; Crouch et al., 2007; Eckstein et al., 2006; Faith et al, 2004; Gregory et al., 2010; Harnack et al., 2009; Haycraft & Blissett, 2008; He & Evans, 2007; Hughes et al, 2008; Johannsen et al., 2006; Keller et al., 2006; May et al., 2007; Powers et al., 2006; Webber et al., 2010). While some studies utilized the Child Feeding Questionnaire, which is based on a parenting theory (Birch et al., 2001), this theory did not provide a guiding framework for the entire study. Other studies discussed previous research and risk factors for obesity; however, the variables and hypotheses tested were not derived from an explicitly stated theory.

### **Gaps in the Literature**

While some studies have attempted to examine the cause of parental misperceptions of their child's weight status, gaps remain in the literature. First, the mixed results presented above illustrate that currently not enough is known about how mothers of preschool age children correctly perceive their child's weight or what factors influence the mother's perceptions. Second, it is not clear what feeding styles mothers

who are currently concerned about their child's weight utilize. Third, while studies have been conducted to examine feeding styles, little has been done to examine styles other than restriction and pressure to eat in relationship to a child's body weight status. Additionally, the majority of the studies have focused on parental feeding styles and have not focused only on the mother. Fourth, there is an inconsistency in the literature as to how maternal beliefs and behavior influence a child's actual body weight status. Finally, there is a gap in the literature regarding a guiding theoretical framework for evaluating maternal concern about a child's weight and maternal behaviors.

The proposed study will fill these gaps by using the theory of dependent care (Taylor & Renpenning, 2011) as a guiding framework for evaluating the relationship between maternal perception and maternal concern about the child's body weight status. Further, the study will determine the relationship between maternal beliefs and behavior and a child's body weight status. The framework proposes a nursing theory affecting health outcomes. However, the study also will evaluate maternal behavioral factors and the child's behavior as a risk factor for early childhood obesity to determine how they moderate the relationship between maternal behaviors and a child's body weight status.

### **Theoretical Framework**

There are several important considerations that must be examined when choosing a theoretical framework for studying childhood obesity. One of those perspectives is the child's developmental stage. The proposed study will evaluate the beliefs and behavior of mothers of preschool-aged children in relationship to a child's body weight status. Preschool-aged children are in Erikson's developmental stage of initiative vs. guilt (Erikson, 1994). In this stage children will often imitate adult behaviors and are

beginning to learn how to make judgments. They are beginning to attempt asserting power and control over their environment, including their eating environment. At this developmental stage the most important relationship to the preschool-aged child is with the family. Consequently, the influence of the family plays a key role in the development of childhood obesity. Therefore, the framework for studying childhood obesity must include at least one member of the family. The framework needs to evaluate the influence the family or a family member has on a child's body weight status as the child learns to make judgments and develop eating behaviors that may last for a lifetime. Many of the behaviors that are related to childhood obesity are self-care activities. Self-care refers to the activities that a person initiates and performs for themselves in the interest in maintaining life, health states, continuing personal development, and well-being (Orem, 2001). Examples of self-care activities are sleep routines, diet, and physical activity. Self-care is learned within the family, which is the preschooler's strongest relationship. It is during the preschool years that children are being socialized to the self-care behaviors of physical activity, sleep, and nutritional habits. These habits are learned, for the most part, from the child's mother. The theory of dependent-care (Taylor & Renpenning, 2011) was selected as the theoretical framework for this study because it allows the investigator to examine the mother/child dyad and determine the effect of maternal influences on child behaviors and health outcomes.

In the theory of dependent-care, when a person is unable to meet their own self-care needs, this inability gives rise to a need for dependent-care. Dependent-care is activities initiated and performed by a mature person for a socially dependent person to help maintain life and contribute to the dependent's health and well-being (Orem, 2001).

The theory of dependent-care describes how a dependent-care agent (e.g., mother) meets the self-care needs of a dependent person (e.g., child) until the dependent is able to meet his or her own needs. Thus, the theory demonstrates the influence of the dependent-care actions and abilities on the dependent's health outcomes. The theory of dependent-care is a corollary to theory of self-care, a constituent theory within the self-care deficit nursing theory as developed by Dorthea Orem. Therefore, to understand the theory of dependent-care, one must understand the self-care deficit nursing theory (Taylor, Renpenning, Geden, Neuman, & Hart, 2001).

### **Overview of Self-Care Deficit Nursing Theory**

The self-care deficit nursing theory has three constituent theories. These constituent theories are the theory of nursing systems, the theory of self-care deficit, and the theory of self-care. The theory of nursing systems subsumes the theory of self-care deficit and through it the theory of self-care. The self-care deficit theory subsumes the theory of self-care (Orem, 2001). These three constituents articulate with each other to express the whole self-care deficit nursing theory (Orem, 2001).

### **Basic Philosophical Assumptions of the Self-Care Deficit Nursing Theory**

There are five basic premises underlying the overall self-care deficit nursing theory. These premises are about human beings and were the guiding principles when nursing was being conceptualized by Orem.

1. "Human beings require continuous deliberate inputs to themselves and their environment in order to remain alive and function in accord with natural human endowments" (Orem, 2001, p. 140).

2. “Human agency, the power to act deliberately, is exercised in the form of care of self and others by identifying needs for and in making the needed inputs” (Orem, 2001, p. 140).
3. “Mature human beings experience privations in the form limitations for actions in care of self and others involving the making of life-sustaining and function–regulating inputs” (Orem, 2001, p.140).
4. “Human agency is exercised in discovering, developing and transmitting to other ways and means to identify needs for and to make inputs to self and others” (Orem, 2001, p. 140).
5. “Groups of human being with structured relationships cluster tasks and allocate responsibilities for providing care to group members who experience privations for making required deliberate input for self and others” (Orem, 2001, p. 140).

To understand the conceptualization of the self-care deficit nursing theory requires an understanding of the philosophical assumptions underlying the central concepts contained in the theory. Orem has described key assumptions about human beings, nursing specific views of human beings, self-care, self-care requisites, deliberate action, self-care deficits, dependent-care, and the need for nursing. The assumptions about human beings are as follows:

- People are unitary beings. Human beings have biological and psychological features (Orem, 1997).
- “A human being is a unity that can be viewed as functioning biologically, symbolically, and socially” (Orem, 1991, p. 181).

- The ability to reflect, symbolize, and use symbolic creations distinguishes human being from other living organisms (Orem, 2001).
- “Each human being, like other living things, is a substantial or real unity whose parts are formed and attain perfection through the differentiation of the whole during the process of development” (Orem, 2001, p.187).
- Human beings appraise situations, objects, and conditions based on the outcome desired (Orem, 2001).
- Human beings reflect, understand, and reason but they know by sensing (Orem, 2001).
- Human beings can be emotionally pulled in one direction but are capable of self-determined action in the opposite direction (Orem, 2001).

According to Orem (1997) five broad views of human beings were necessary for developing an understanding of the self-care deficit nursing theory. The five broad views of human beings, expressed in the self-care deficit nursing theory, established the proper object of nursing. Additionally, these views were facilitating in the development and structuring of nursing knowledge (Orem, 1997). These five broad assumptions about how nursing views human beings are as follows:

- Nursing view of human being as a person: “Individual human being are viewed as embodied persons with inherent rights that become sustained public rights who live in coexistence with other people” (Orem, 1997, p. 28).
- Nursing view of the human being as an agent: “Individual human being are viewed as persons who can bring about conditions that do not presently exist in humans or in their environmental situations by deliberately acting using

valid means or technologies to bring about foreseen and desired results” (Orem, 1997, p. 28).

- The view of humans as users of symbols: Human beings are viewed as using symbols. Humans attach meaning to symbols and use symbols to stand for things. Humans use symbols to express ideas and communicate ideas and information to others by using language and other forms of communication (Orem, 1997).
- Nursing view of the human being as an organism: “Individuals are viewed as unitary living beings, who grow and develop, exhibiting biological characteristics of Homo sapiens during known stages of the human life cycle” (Orem, 1997, p. 29).
- Nursing specific view of object: “Individual human beings are viewed as having the status of an object subject to physical forces whenever they are unable to act to protect themselves against such forces. Inability of individuals to surmount physical forces such as wind or forces of gravity can arise from the individual and prevailing environmental conditions” (Orem, 1997, p. 29).

Assumptions about self-care are as follows:

- Self-care is a human regulatory function, separate and distinct from other human regulatory functions (Orem, 2001, p. 45).
- Self-care is understood as a voluntary behavior, a behavior that is guided by principals that give direction to the action (Orem, 2001, p. 45).
- Self-care is a learned activity. Self-care is learned through communication and interpersonal relations (Orem, 2001, p. 45).

- Adults are viewed as having the responsibility and the right to care for themselves maintaining their own life and health. Additionally, adults have these responsibilities to care for those socially dependent on them (Orem, 2001, p. 45).
- Supervising self-care, providing self-care, or assisting with self-care is a component of infant and childcare, care of adolescents, and care of the aged (Orem, 2001, p. 45).
- Adults may require assistance from a person in health-care or social services if the person is unable to maintain or obtain the needed conditions to preserve life and promotion of health for themselves or the persons dependent. A person may require assistance to supervise or accomplish care of self and care of dependents (Orem, 2001, p. 45).

Self-care is done in order to meet self-care requisites. Self-care requisites are the product of investigations as to what can and should be regulated, and are expressed as actions to achieve regulatory goals (Orem, 2001, p. 236). Self-care requisites are required to maintain and sustain well-being and life. There are three types of requisites: universal self-care requisites, developmental self-care requisites, and health-deviation self-care requisites (Orem, 2001). Together these requisites create a person's therapeutic self-care demand. The assumptions underlying the self-care requisites are as follows:

- All human beings naturally have a need to take in materials (food, air, water). Human beings, by nature, have a need to develop and maintain conditions that support life processes. Human beings have a need, by nature, to develop and



support structural integrity and develop and promote functional integrity (Orem, 2001).

- “Human development, from intrauterine life to adult maturation, requires the formation and maintenance of conditions that promote known growth and development processes at each period of the life cycle” (Orem, 2001, p. 48).
- Any condition or deficit that creates a deviation from normal functioning and well-being brings about a need for regulation to control and mitigate the effects of the condition or deficit and a need for prevention (Orem, 2001).

According to Orem (2001), deliberate action is required for persons to meet their self-care requisites. Deliberate action is a process by which a person, by what they do, either achieve or move toward achievement of some foreseen result or end (Orem, 2001, p. 515). When an individual performs a deliberate action, the person has intentions and is conscious of these intentions to bring about a state of affairs or a condition that does not presently exist (Orem, 2001). Deliberate action has intentional aspects or phases and productive phases. Intentional phases of action are the components related to the ends and the means of the actions. Components related to the actions that produce the ends are the productive phase (Orem, 2001). The assumptions underlying deliberate actions include:

- The person performing the actions is known as the agent. The agent has sensory knowledge and awareness of the reality of the situation of action. When the agent is deciding which action is appropriate to take, the agent will reflect on the current conditions and circumstances. Reflection stops when the agent makes a decision about the appropriate course of action (Orem, 2001, p. 65).

- Accepting that deliberate action requires reflection, judgment, and decision-making accepts that human beings are inherently active rather than passive to stimuli (Orem, 2001, p. 65).
- People need to have the knowledge to determine if something is desirable or undesirable. Additionally, people need to be able to reflect on the desirability or undesirability of an action. The ways to achieve it and the goals must be identified and conceptualized (Orem, 2001, p. 65).
- Reasons for selecting certain actions to attain what has been appraised as good or desirable and afforded the tentative status of a goal should be known (Orem, 2001, p. 65).
- Knowledge is required for a human being to develop ideas about a particular action or to develop an image of the goal. Development of ideas and images also takes time (Orem, 2001, p. 65).
- A human being's reflection should be directed toward two questions: Is this way of acting good or desirable to achieve the goal? And is this way of acting more desirable than other ways to achieve the goal? (Orem, 2001, p. 65).
- When clear images or ideas are formed and a decision about a chosen action has been made, reflection should cease (Orem, 2001, p. 66).
- A person owns his or her appraisal of possible ways of actions to attain a goal and his or her decision to act according to one or a combination of these ways, when this way of acting is formalized and incorporated into a person's self-image or self-concept (Orem, 2001, p. 66).

- When a human being continues to raise questions about which action to take in a particular situation and directs attention toward different aspects of a situation, reflection can go on indefinitely (Orem, 2001, p. 65).
- To take action, human beings must decide on a suitable course of action and exclude other courses of action (Orem, 2001, p. 65).
- Purposive action taken by human beings requires them to be aware of conditions, situations, and objects. Human beings need to know how to contend with and treat the conditions, situations, and objects (Orem, 2001, p. 65).
- Agents, i.e. human beings, act deliberately to attain a goal or a desired outcome (Orem, 2001, p.65).

When humans are unable to take deliberate action, to perform the self-care required to meet their self-care needs then a self-care deficit is said to exist. There are nine key assumptions underlying the concept of self-care deficit. A self-care deficit exists when a person's self-care agency is not sufficient to produce the self-care required to meet some or all of their self-care requisites (Orem, 2001).

- “Persons who take action to provide their own self-care for dependents have specialized capabilities for action” (Orem, 2001, p. 147).
- “Individuals’ ability to engage in self-care or dependent-care is conditioned by age, developmental state, life experience, sociocultural orientation, health, and available resources” (Orem, 2001, p. 147).

- “Relationships of individuals’ abilities for self-care or dependent-care of the qualitative or quantitative self-care or dependent-care demand can be determined when the value of each is known” (Orem, 2001, p.147).
- “The relationship between care abilities and care demand can be defined in terms of equal to, less than or more than” (Orem, 2001, p. 147).
- “Nursing is a legitimate service when (1) care abilities are less than those required for meeting a known self-care demand (a deficit relationship) and (2) self-care or dependent-care abilities exceed or are equal to those required for meeting the current self-care demand, but a future deficit relationship can be foreseen because of predictable decrease in care abilities, qualitative or quantitative increases in the care demand, or both” (Orem, 2001, p. 147).
- “Persons with existing or projected care deficits are in, or can expect to be in, states of social dependency that legitimate a nursing relationship” (Orem, 2001, p. 147).
- “A self-care deficit may be relatively permanent or it may be transitory” (Orem, 2001, p. 147).
- “A self-care or a dependent-care deficit may be wholly or partially eliminated or overcome when persons with deficits have the necessary human capabilities, dispositions, and willingness” (Orem, 2001, p. 147).
- “Self-care deficits, when expressed in terms of persons’ limitation for engagement in the estimative (intentional) or production operations of self-care, provides guides for selection of methods of helping and understanding patient role in self-care” (Orem, 2001, p.147).

Limitations in self-care agency lead to self-care deficits. There are three types of limitations. The three types of limitations are (a) restrictions of knowing, (b) restrictions on judgment and decision-making, and (c) restrictions on result-achieving actions (Orem, 2001, p. 279). If a self-care deficit exists then dependent-care is needed. Assumptions underlying dependent-care include the following:

- The dependent-care agent knows and can meet, in part or in whole, the therapeutic self-care demand of the dependent (Orem, 2001, p. 285).
- “The relationship of the dependent-care agent to the person to be helped, the willingness of the person to accept help, and the sense of duty on the part of each will affect what can be accomplished” (Orem, 2001, p. 286).
- The abilities of the dependent-care agent are greater than the abilities of the dependent (Taylor et al., 2001).

If the dependent care agent is unable to overcome the self-care deficit of the dependent then nursing intervention is required.

### **Concepts Within the Self-Care Deficit Nursing Theory**

From the underlying assumptions of the theory, as stated above, the concepts of theory emerged. The concepts are basic conditioning factors (BCF's), therapeutic self-care demand, self-care requisites, self-care agency, self-care, self-care deficit, and dependent-care.

**Basic conditioning factors.** Basic conditioning factors (BCF's) are factors that are either internal or external to a person that affect the amount or the type of self-care required or affect the person's ability to engage in self-care. Basic conditioning factors affect the adequacy, development, or operability of a person's ability to care for either

themselves or another person. These basic conditioning factors condition the therapeutic self-care demand. The BCF's are age, gender, developmental state, health state, health care systems factor, family systems factor, patterns of living, environmental factors, and resource availability and adequacy factors (Orem, 2001, p. 245).

**Age.** Age is the age of the person whose requisites need to be met. For example, the amount of food a person needs is dependent on age. An infant will need less food than a child for normal growth and development to meet the universal need for the intake of sufficient food (Orem, 2001).

**Gender.** The gender of male or female affects the self-care requisite to be met. For example, a female over 40 needs yearly mammograms. A male needs yearly testicular examinations. Gender affects the universal need for the intake of food. Typically, a male requires more food to sustain life than a female requires to sustain life.

**Developmental state.** Developmental state refers to the stage of development of the person meeting the self-care requisites (Orem, 2001). For example, infants and adolescents all need a sufficient intake of food to sustain life. However, that requisite is met in different ways due to the developmental state of the person. An infant needs someone to feed them and prepare the food for them, while the adolescents can prepare the food by themselves and the adolescent does not require any assistance in consuming the food.

**Health state.** A person's health state can bring about obstacles and conditions that interfere with a person's ability to meet their self-care requisites (Orem, 2001). For example, a person who becomes a quadriplegic will not be able to meet many of the

universal self-care requisites. Even the universal self-care requisite of the need for intake of air will require the use of technology with a ventilator.

***Sociocultural orientation.*** “Sociocultural orientation of persons to health and health care, the care measures prescribed by their culture, and the care measure families will and will not accept all condition what will and what will not be admitted into the therapeutic self-care demands of family members” (Orem, 2001, p. 246). For example, the Amish often isolate themselves from mainstream America to protect their culture, and therefore are often isolated from medical care. As part of the Amish culture home remedies are attempted as the first line medical treatment. The Amish often do not seek western medical care and treatment unless it is absolutely necessary or until a disease is in an advanced state (Centers for Health Disparities, 2011).

***Health care systems factors.*** Health care systems factors can create or can bring about obstacles or create conditions that interfere with a person’s meeting the self-care requisites (Orem, 2001). Examples of health care systems factors include medical diagnosis and the treatment options associated with the diagnosis (Orem, 2001).

***Family systems factors.*** Family systems factors conditions the therapeutic self-care demand by limiting what self-care requisites and the means for meeting them will be accepted and allowed by the family (Orem, 2001). For example, a Jehovah’s Witness will not accept blood products. Therefore, if a blood product is needed and the person is a Jehovah’s Witness, the care measure will not be accepted by the family.

***Patterns of living.*** A person’s pattern of living affect the therapeutic self-care demand mainly by limiting what self-care requisites and the means to meet those requisites will be accepted (Orem, 2001). For example, a person who chooses to live in

isolation from other people, by working from home, living alone, and not partaking in outside social activities, may not meet the requisite for a balance between isolation and social interaction.

***Environmental factors.*** The environment in which a person lives affects the therapeutic self-care demand mainly by limiting what self-care requisites and the means to meet those requisites will be accepted (Orem, 2001). For example, children living in unsafe neighborhoods may not be as physically active as children who are safer while playing outdoors.

***Resource availability and adequacy.*** Resource availability and adequacy mainly affects the means by which the self-care requisites can be met (Orem, 2001). For example, a person who does not have health insurance may not be able to meet the universal self-care requisite of the need to prevent hazard to life, functioning, or well-being. A person may develop symptoms of a life threatening disease such as cancer, but without the resource of insurance, they may not seek out and secure medical care in time to save the person's life.

**Therapeutic self-care demand.** Therapeutic self-care demand stands for the actions required to meet all of the formalized and particularized self-care requisites of a person during a particular time period. The self-care demand is the summation of care measures or actions needed to meet the outstanding requisite. Therapeutic was added to self-care demand to indicate that the care measures, action sequences, or processes through which the outstanding requisite will be met have either presumed or actual validity in effecting the desired outcome on the human development or regulatory function (Orem, 2001).



Self-care requisites are the product of investigations as to what can and should be regulated. Self-care requisites are required to maintain and sustain well-being and life. There are three sets of requisites that create the therapeutic self-care demand: universal self-care requisites, developmental self-care requisites, and health-deviation self-care requisites (Orem, 2001).

***Universal requisites.*** There are universal self-care requisites that are common to all human beings. Universal self-care requisites are required throughout a person's lifetime (Orem, 2001, p. 225).

- Maintenance of sufficient intake of air, water, and food (Orem, 2001, p.225).
- Provisions of care associated with the human elimination process (Orem, 2001, p. 225).
- A required balance between rest and activity and a balance between solitude and social interaction (Orem, 2001, p. 225).
- To prevent hazard to human functioning, human life and human well-being (Orem, 2001, p. 225).
- “Promotion of human functioning and development within social groups in accord with human potential, know human limitations, and the human desire to be normal. Normalcy is used in the sense of that which is essentially human and that which is in accord with the genetic and constitutional characteristics and talents of the individual” (Orem, 2001, p. 225).

Represented in these requisites are actions required to develop the internal and external conditions needed to maintain human structure and function. When human structure and function is maintained human maturation and development is supported.

When self-care is provided around these requisites, and provided effectively, self-care fosters health and well-being (Orem, 2001).

***Developmental requisites.*** Each person develops into a unique individual within society. Within each family the conditions and situations that promote and support development vary. In life, people experience internal or external conditions that may affect development at any give stage during the person's lifetime. At certain stages of development a person becomes personally involved in the development and movement toward maturity. During specific stages of life, such as infancy and childhood, a parent, dependent-care agent, or another person will need to meet the developmental requisites (Orem, 2001, p. 230). The developmental requisites are as follows:

- Provision of conditions that promote development (Orem, 2001, p. 231).
- Engagement in self-development (Orem, 2001, p. 231).
- Preventing or overcoming effects that adversely affect development (Orem, 2001, p. 231).

***Health-deviation self-care requisites.*** In addition to the universal self-care requisites, there are health-deviation self-care requisites. These requisites exist for people, who have a chronic condition, are ill, have a congenital deficit, a disability, or are under treatment for a medical condition (Orem, 2001). When a person has a deviation in health, they may change from the self-care agent to the receiver of care. When a health condition or conditions arise, there is a need to identify which actions need to be taken and how these actions should be implemented to restore normalcy. A person is partaking in self-care actions when the person seeks out medical care and treatment. Health-deviation requisites are needed during a time of acute or chronic illness or illness

exacerbation. Health-deviation requisites are geared at improving or restoring mental and physical health (Orem, 2001). A person's changing state of health produces health-deviation self-care requisites related to:

- The event of an exposure to a biological or physical agents or environmental conditions that are associated with human pathology, a person seeks out and secures appropriate medical assistance. People seek out and secure medical assistance when there is evidence of physiological, psychological or genetic conditions that is known to produce human pathology (Orem, 2001).
- To be aware of and to attend to the results and effects of pathological states and conditions, including effects on development (Orem, 2001).
- To carry out effectively any prescribed diagnostic, rehabilitative or therapeutic measures that are directed at either preventing or treating the pathology, the correction of human abnormalities or deformities, the regulation of human integrated function, or compensation for disabilities (Orem, 2001).
- To be aware, to attend to or to regulate the discomforting effects of treatment for a human pathology prescribed by or performed by a physician, including development (Orem, 2001).
- To accept oneself in a particular state of health and needing help. Accepting a particular state of health includes modifying and accepting ones self-concept or self-image (Orem, 2001).
- To learn to live with the effects of the condition and/or treatment measures in a life cycle that promotes development (Orem, 2001).

**Self-care.** “Self-care is a human regulatory function” (Orem, 2001, p. 143). Self-care is different from other human regulatory functions in that it is actions that are deliberately performed. Self-care actions are behaviors that a mature person performs on their own behalf to maintain healthful functioning, maintain life, well-being and to continue personal development by meeting the known for developmental and functional regulations (Orem, 2001, p. 143). Self-care is a purposeful, deliberate action or a series of actions taken by a mature or maturing adult to maintain health, promote well-being and development. Self-care is a learned behavior. The most common place to learn self-care is within the family (Orem, 2001). A person may be the provider of self-care (self-care agent) and the recipient of self-care (dependent-care). A person who provides self-care to an infant, child, or adolescent or another socially dependent person is a dependent-care agent.

**Self-care agency.** Self-care agency is “the complex acquired capability to meet ones continuing requirement for care of self that regulates life process, maintains or promotes integrity of human structure and functioning and human development, and promotes well-being” (Orem, 2001, p. 254). An individual’s self-care agency varies over a range given the person’s development state of infancy to adulthood. Self-care agency also varies with respect to a person’s health-state, with life experiences, for exposure to cultural experiences, and for the utilization of resources for daily living. The self-care agency of a person, at a given point in time, is conditioned by the factors that affect its operability and its development (Orem, 2001). Self-care agency develops during day-to-day living through the spontaneous process of learning.

Self-care agency is a three-part structure. These are:

- “Self-care operational capabilities for performing estimative, transitional, and productive self-care operations” (Orem, 2001, p. 257).
- “A set of power components enabling the performance of self-care operations” (Orem, 2001, p. 257).
- “Five sets of foundational capabilities and dispositions articulating with the power components in their relationship to operational conditions” (Orem, 2001, p. 257).

Self-care agency is conceptualized as containing three parts: self-care operations, power components, and foundational dispositions and basic capabilities. One component of the three part structure are the operations of self-care agency that are understood in relation to operations specific to the phases of deliberate action, including estimative, transitional, and productive operations (Orem, 2001). Estimative type operations investigate internal and external factors and conditions related to self-care. Estimative type operations investigate the meaning of factors and characteristics conditions and their regulations. Estimative type operations investigates the question, “How can existent conditions and factors be regulated” (Orem, 2001, p. 259)? Transitional type operations are a reflection to determine which type of self-care should be followed and deciding what to do with respect to self-care.

“Productive type operations are preparation of materials, environmental settings or self for the performance of regulatory type self-care operations and the performance of productive self-care operations with specific regulatory purposes with a time period” (Orem, 2001, p. 259). Additional productive type operations are determining the presence of conditions known to affect the effectiveness of performance and results, and

monitoring for the presence of these conditions. Productive type operations include monitoring for the evidence of desired effects and results, and monitoring for untoward effects and results (Orem, 2001). Another productive type operation is “reflection to determine and confirm evidence of adequacy of performance and presence of regulatory results” (Orem, 2001, p. 260). Lastly, productive type operations are making decisions about regulatory process, as to whether to continue the process, to cease the process, or to cease the process and continue at a later time. A decision about estimative operations is also made as to whether to continue with current information obtained in estimative operations or begin a new series of estimative operations (Orem, 2001).

Power components are the second component of the three-part structure of self-care agency. The power components are believed to be an intermediary between the estimative, transitional, and productive self-care operation and the five sets of foundational capabilities and dispositions (Orem 2001, p. 264). Orem (2001) identifies ten power components that are necessary for the engagement of self-care operations. The power components specify the particular power a human being needs to have developed to engage in self-care operations (Orem, 2001). The power components are as follows:

- “Ability to maintain attention and exercise requisite vigilance with respect to self as self-care agent and internal and external conditions and factors significant for self-care” (Orem, 2001, p. 265).
- “Controlled use of available physical energy that is sufficient for the initiation and continuation of self-care operations” (Orem, 2001, p. 265).

- “Ability to control the position of the body and its parts in the execution of the movements required for the initiation and completion of self-care operations” (Orem, 2001, p. 265).
- “Ability to reason within a self-care frame of reference” (Orem, 2001, p. 265).
- “Motivation” (Orem, 2001, p. 265).
- “Ability to make decisions about care of self and to operationalize these decisions” (Orem, 2001, p. 265).
- “Ability to acquire technical knowledge about self-care from authoritative sources, to retain it, and to operationalize it (Orem, 2001, p. 265).
- “A repertoire of cognitive, perceptual, manipulative, communication, and interpersonal skills adapted to the performance of self-care operations” (Orem, 2001, p. 265).
- “Ability to order discrete self-care actions or action systems into relationships with prior and subsequent actions toward the final achievement of regulatory goals of self-care” (Orem, 2001, p. 265).
- “Ability to consistently perform self-care operations, integrating them with relevant aspects of personal, family and community living” (Orem, 2001, p. 265).

Articulating with the power components are five sets of foundational capabilities and dispositions. One part in the three-part structure of self-care agency is the five sets of foundational capabilities and dispositions. The *Selected Basic Capabilities* are foundational for the engagement in self-care and in other activities. Examples of basic capabilities include sensation, attention, learning, and perception. The set of *Knowing*

*and Doing Capabilities* are established from those that affect reasoning, knowing, decision making, and making the right judgments during life situations and includes learned skills that affect investigative and productive operations as well as communication. Examples of knowing and doing capabilities are rational agency, operational knowing and learned skills such as reading, counting, writing and verbal skills. The *Disposition Affecting Goals Sought* is an expression of conditions of a person's willingness to examine one self. It is an expression of a person's willingness to accept themselves as self-care agents, to perform certain self-care measures or a willingness to accept themselves as in need of particular self-care measures. Examples of the disposition affecting goals sought are self-understanding, self-awareness, self-concept, and self-value. The set of *Significant Orientative Capabilities and Dispositions* are determinants of a person's ability to engage in self-care, concern about health, willingness to engage in self-care, and interests and enduring habits (Orem, 2001). Examples of significant orientative capabilities and dispositions are orientations to time, health state, and other people interests and habits (Orem, 2001).

**Self-care deficit.** If there is a limitation in a person's self-care agency, then a self-care deficit exists. These deficits may occur due to three types of limitations, (a) restrictions of knowing, (b) restrictions on judgment and decision-making, and (c) restrictions on result-achieving actions (Orem, 2001, p. 279). A person's *limitation of knowing* is "about ones own functioning, about needed self-care and about the operations through which self-care is accomplished are associated with an individuals' past experiences and with what is being experienced in the present" (Orem, 2001, p, 279). *Limitations for making judgments and decisions* about the regulation of the exercise or



development of self-care agency or about the components of a therapeutic self-care demand, are associated with an individual's view of themselves, their desire to take action that is appropriate and beneficial, their habits of investigation and reflection before making decisions about what action to take, and having the requisite skills and knowledge (Orem, 2001, p. 280). Lastly, *restrictions on result-achieving actions* within the investigative and production phases of self-care, including limitations for self-management, are associated with environmental circumstances and conditions and with human functional states (Orem, 2001, p. 281).

When one of the above limitations is present a self-care deficit exists. The term self-care deficit refers to the relationship between a persons' self-care agency and therapeutic self-care demand (Orem, 2001). When a person has a limitation in their self-care agency to meet either all or some of the components of their therapeutic self-care demand a self-care deficit exists (Orem, 2001). Self-care deficits can be partial or complete. A partial self-care deficit may be limited to an inability to meet one or several of the person self-care requisites within a therapeutic self-care demand. When the self-care deficit is complete a person does not have the capabilities to meet a therapeutic self-care demand (Orem, 2001). Some examples of conditions that would demonstrate evidence that a self-care deficit exists are:

- An absence in the engagement of self-care or a gross inadequacy in what the person is doing to meet the self-care requisites (Orem, 2001, p. 282).
- A limited awareness or loss of awareness of self or the environment, except during natural sleep (Orem, 2001, p. 282).

- Limitations for judgment and decision-making about self-care related to a lack of knowledge and lack of familiarity with internal and external conditions (Orem, 2001, p. 282).

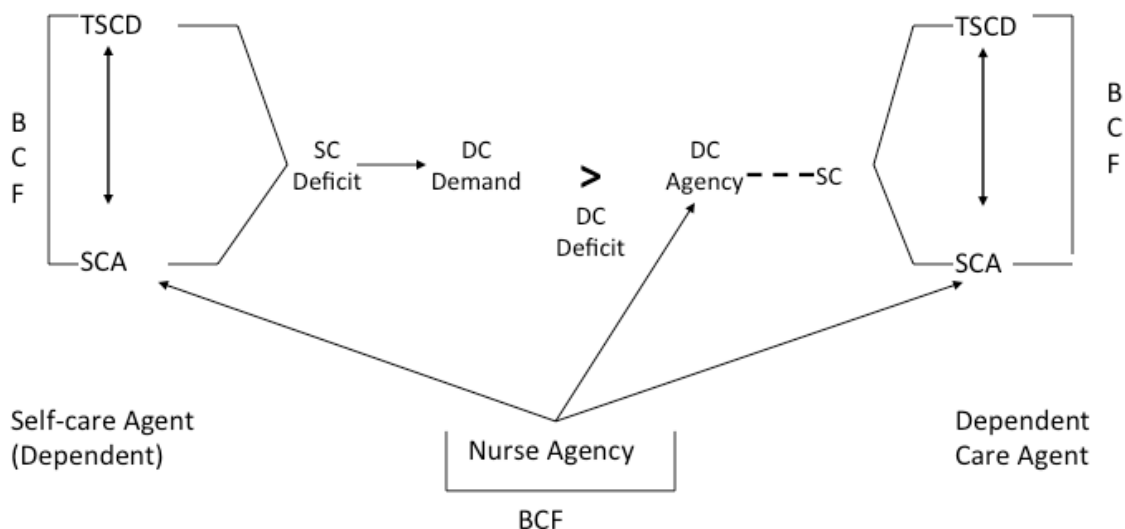
**Dependent-care.** If a self-care deficit exists then Orem (2001) states that dependent-care is required. Dependent-care is “the practice of activities that responsible mature or maturing persons initiate and perform on behalf of socially dependent persons for some time on a continuing basis to meet their therapeutic self-care demand” (Orem, 2001, p. 515). Dependent-care is provided for a socially dependent person in order to maintain life, to contribute to the dependents health and well-being, and to regulate and exercise the development of the dependents self-care agency (Orem, 2001, p.515). It is possible that the dependent-care agent may not have sufficient dependent-care agency to meet the needs of the dependent. In this case a dependent-care deficit is said to exist.

**Dependent-care deficit.** A dependent-care deficit is when the dependent-care agent’s powers and capabilities for meeting the therapeutic self-care demands of the dependent are inadequate. Orem believes that when a self-care deficit or a dependent-care deficit exists, these deficits give rise to the need for nursing.

Although Orem (2001) initiated the discussion regarding the role of a dependent-care agent in meeting the needs of a socially dependent person, the theory of dependent-care was developed to fill a void in the theory of self-care as identified by Taylor, Renpenning, Geden, Neuman, & Hart, in 2001. Specifically, the theory of dependent-care identified that when there is a self-care deficit, a dependent-care demand is created (Taylor et al., 2001). The concept of dependent-care demand does not exist within Orem’s theory of self-care. Therefore, there is no measure to make a judgment about the

adequacy of the responsible person dependent-care agency (Taylor & Renpenning, 2011). In addition to including the new concept of dependent-care demand, the theory of dependent-care also more clearly explicates the dyadic relationship that exists between the self-care needs of the dependent and the dependent-care agent's dependent-care agency and behaviors, as well as addressing the dependent-care agent's own self-care requirements. See Figure 1.

*Figure 1. Theory of Dependent Care\**



\*Taylor & Renpenning, 2011

The theory of dependent-care has its foundation in socially dependent people's inability to meet their own self-care needs (Taylor & Renpenning, 2011). The theory of dependent-care was first introduced as a corollary to the theory of self-care, as such; an understanding of self-care is foundational to understanding the theory of dependent-care (Taylor & Renpenning, 2011). The theory of dependent-care differs from the theory of

self-care when a self-care deficit arises. A self-care deficit in a socially dependent person creates a dependent-care demand. It is against the dependent-care demand that the agency or abilities of the dependent-care agent are judged. If the dependent-care agent has limited abilities and cannot meet the needs of the dependent, a dependent-care deficit is created, and nursing intervention is needed. Similar to the theory of self-care, the theory of dependent-care originates from a person's need for regulatory processes to be met in order to maintain life, health, and well-being (Taylor & Renpenning, 2011).

### **Philosophical Assumptions**

Underlying the theory of dependent-care are three sets of premises in addition to the assumptions contained within the self-care deficit nursing theory that were described above. These premises include persons in relations, premises about interpersonal action systems, and premises about social dependency (Taylor & Renpenning, 2011). These assumptions are as follows:

- Relationships are essential to life. People are defined in regard to their relationships with others and to the natural world (Taylor & Renpenning, 2011, p. 109).
- Human relationships are essential to the psychosocial and physical development of human beings, and are also essential to the continuing development of the social self (Taylor & Renpenning, 2011, p. 109).
- The interaction between humans is a dynamic process and is continuous and always present (Taylor & Renpenning, 2011, p. 109).

- Action systems exist between two or more people. These action systems are purposeful and require an exchange of information (Taylor & Renpenning, 2011, p. 109).
- Multiple subsystems of actions exist within a family. Two of these subsystems include parenting and dependent-care (Taylor & Renpenning, 2011, p. 109).
- One of the interpersonal action systems of the family is the socialization of members to the role of self-care and dependent-care agents (Taylor & Renpenning, 2011, p. 109).
- Social groups expect and accept that one person may be socially dependent on another person (Taylor & Renpenning, 2011, p.109).
- Social dependency gives rise to dependent-care (Taylor & Renpenning, 2011, p. 109).
- Social dependency can exist throughout the lifespan. The dependency can be related to health state, age, and/or developmental level (Taylor & Renpenning, 2011, p. 109).
- The relationships can be identified as independent, interdependent, or dependent. Social dependency can be either emotional or instrumental and may give rise to the need for a dependent-care system (Taylor & Renpenning, 2011, p. 109-110).

### **Concepts and Terms in the Theory of Dependent-Care**

There are several concepts within the theory of dependent-care that are the same as in the self-care deficit nursing theory. These concepts are the basic conditioning factors, therapeutic self-care demand, self-care agency, and self-care deficit, which could

apply to both the dependent as well as the dependent-care agent. In addition, concepts of dependent-care agent, dependent-care agency, and dependent-care deficit were initially identified by Orem in the self-care deficit nursing theory. In addition to these concepts, there are several additional terms utilized in the theory of dependent-care. According to Taylor and Renpenning (2011) the theory of dependent-care incorporates the following concepts, which are described below: dependency, dependent-care, dependent-care agent, dependent-care agency, dependent-care demand, dependent-care deficit, dependent-care system, dependent-care unit, family, and social dependency.

**Dependency.** Dependency is a relationship between two or more people in which one person requires some form of assistance from the other person (Taylor & Renpenning, 2011).

**Dependent-care.** Dependent-care is the practice of activities or behaviors a person takes to meet the therapeutic self-care demands of a dependent person. Dependent-care can be a continuously ongoing set of actions or actions that occur only over a short period of time. The length of time dependent-care continues is governed by the limitations of the dependent's self-care agency. When dependent-care is practiced and actions are taken to meet the therapeutic self-care demand of a dependent person, the dependent person is learning self-care behaviors, thus, developing self-care agency (Taylor & Renpenning, 2011).

**Dependent-care agent.** The dependent-care agent is a mature or maturing person who accepts and fulfills the responsibility for knowing and meeting the therapeutic self-care demand of a person who is socially dependent on them to regulate the development or exercise the person's self-care agency (Orem, 1995).

**Dependent-care agency (DCA).** Dependent-care agency is a person's acquired ability to know and meet all or some of a dependent's self-care requisites for a person who has a health-associated or health derived limitation of self-care agency that has placed the person in a position of social dependency (Taylor & Renpenning, 2011).

**Dependent-care demand (DC demand).** The dependent-care demand is "the summation of care measures at a specific point in time or over a duration of time for meeting the dependent's therapeutic self-care demand when his or her self-care agency is not adequate" (Taylor & Renpenning, 2011, p. 108). The following statements characterize the dependent-care demand:

- "The dependent-care demand is a function of the self-care limitations of the dependent" (Taylor & Renpenning, 2011, p. 112).
- Dependent-care demand is constructed from self-care deficit. The dependent-care demand is not the same as the self-care deficit. It is the summation of care measures to be performed by another person (Taylor & Renpenning, 2011, p. 112).
- The dependent-care demand must exist within the dependent. The dependent-care demand must be known by the dependent care agent in order for a dependent-care system to be developed and for the demand to be met (Taylor & Renpenning, 2011, p. 113).
- When the dependent is a mature or a maturing person, the knowing of the demand needs to be a joint action between the dependent and the dependent-care agent (Taylor & Renpenning, 2011, p. 113).

- “In infants and children, the expression of the demand that is the basis of action is constructed by the dependent-care agent in terms of the particularized self-care requisites of the dependent” (Taylor & Renpenning, 2011, p. 113).
- When the dependent is a mature person who is unable to participate in making the demands known the dependent-care agent must express the demand for the person. The dependent-care agent may require help from a professional to express this demand (Taylor & Renpenning, 2011, p. 113).
- Depending on the nature of the dependency, the attributes of the dependent-care demand may vary. These variations may be related to development, age and/or health state (Taylor & Renpenning, 2011, p. 113).
- “The quantity and quality of dependent-care required by an individual are a function of the complexity of the individuals self-care demand and nature of the self-care limitations” (Taylor & Renpenning, 2011, p. 113).

**Dependent-care deficit.** When the amount and type of care needed by the dependent exceeds the ability of both the dependent and the dependent-care agent, a dependent-care deficit is created (Taylor et al, 2001). “A dependent-care deficit is a statement about the relationship between the DC demand and the powers and capabilities of the dependent-care agent to meet the DC demand when the DC demand exceeds the DCA” (Taylor, et al., 2001. p. 40).

**Dependent-care system.** The dependent-care system consists of a course or sequence of actions that have been or are currently being performed for a dependent person by a dependent-care agent to meet the particularized self-care requisites. The



dependent-care system is comprised of a socially dependent person and the dependent-care agent. A dependent-care system is influenced by the dependency. The system is intentional and has a purpose. There are specific actions that make up the dependent-care system including (a) functions of the self-care agency and therapeutic self-care demand of the dependent, (b) the dependent-care agency, the self-care agency, and the therapeutic self-care demand of the caregiver, and (c) the interpersonal dimensions at the time care is being provided. A dependent-care system is created in response to a dependent-care demand (Taylor & Renpenning, 2011).

**Dependent-care unit.** The dependent-care unit is comprised of the socially dependent person with limitations in their self-care agency and the dependent-care agent or dependent-care agents. A dependent-care unit may include people who are not by definition dependent-care agents (Taylor et al., 2001, p. 40).

**Family.** “A system or unit of interacting persons related by marriage, birth or other strong social bonds with commitments and attachments among unit members that include future obligations and whose central purpose is to create, maintain, and promote the social, mental, physical, and emotional development of each of its members” (Taylor et al., 2001, p. 40).

**Social dependency.** Social dependency occurs when a person requires assistance from members in society. It is the culture of the social group that determines the nature and extent of the assistance provided (Taylor & Renpenning, 2011).

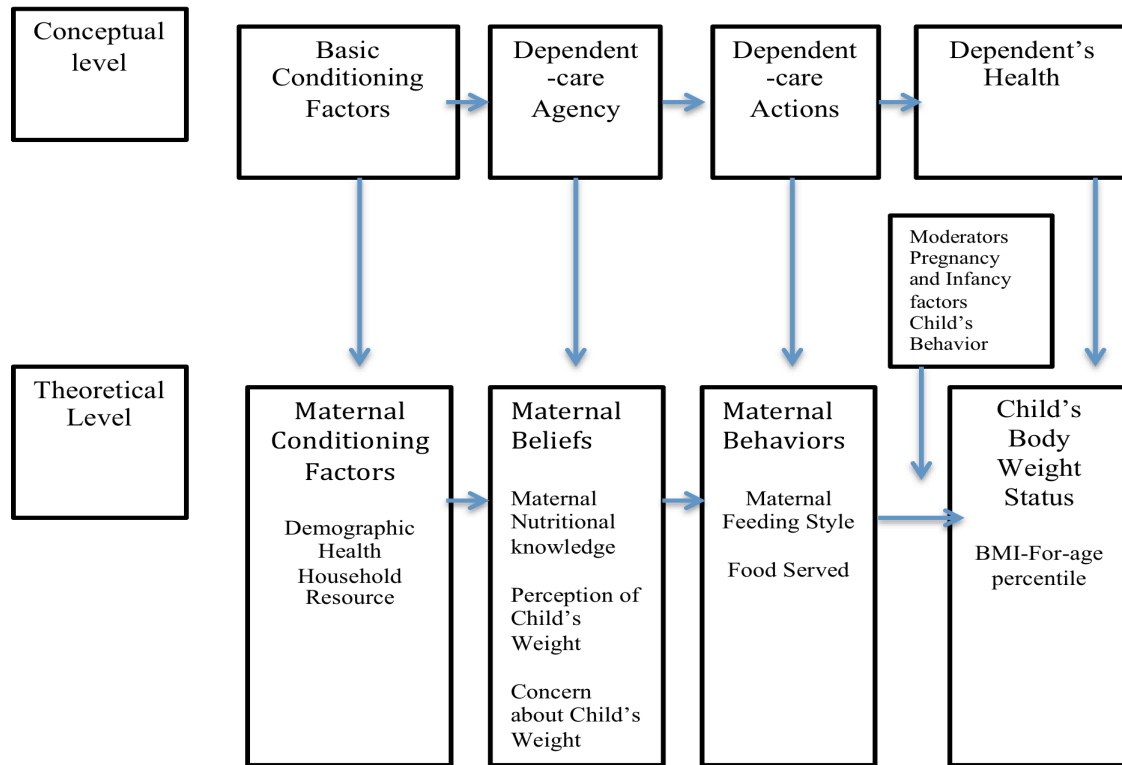
### **Theory of Maternal Influence on a Child’s Health**

The theory of dependent-care (Taylor & Renpenning, 2011) was chosen as the overarching conceptual framework for the proposed study because it provides a broad

framework for examining the effect of dependent-care agency and dependent-care on the development of a child's self-care behaviors related to weight control. From the theory of dependent-care, a middle-range theory of maternal influence on child health (TMICH) was developed. It is the TMICH that will guide the actual conduct of the proposed study. The TMICH was created using a deductive theory-building strategy (Fawcett, 2005) in which concepts from the theory of dependent-care were substructured to more concrete terms within the TMICH.

There are seven key concepts in the TMICH that have been substructured from the theory of dependent care, including mother/child dyad, maternal conditioning factors, maternal beliefs, maternal behaviors, child's body weight status, child's behaviors, and pregnancy and infancy factors. The following section contains the conceptual definitions that are found in the theory of dependent-care as well as the theoretical definitions developed by this author that are specific to TMICH. Figure 2 depicts the relationship between the conceptual and theoretical concepts.

Figure 2. Theory of Maternal Influence on Child's Health



### TMICH Concepts and Definitions

**Dependent-care unit.** At the conceptual level, the dependent-care unit is comprised of the dependent-care agent or agents and the dependent person who has limitations in self-care agency. At the theoretical level, the dependent-care unit is the *mother/child dyad*. The mother is the biological or adoptive mother who cares for the child and with whom the child resides.

**Basic conditioning factors.** At the TMICH level, basic conditioning factors are termed *maternal conditioning factors*. The basic conditioning factors affect the values and ways of meeting the self-care requisites. Basic conditioning factors affect the adequacy, development, or operability of a mother's ability to care for either themselves

or the child. In the proposed study *maternal conditioning factors* are factors either internal or external to the mother that influence maternal beliefs and include maternal demographic factors, health factors, household factors, and resource factors. Maternal demographic factors included maternal level of education, maternal race, maternal age, and maternal ethnicity. Health factors refer to whether the mother has obesity related type II Diabetes diagnosis or if the child's doctor has ever told the mother they are concerned about the child's weight. While there are other health conditions that are associated with obesity, 95% of the cases of type II diabetes are caused by obesity. However, this is not the case for other obesity-related diagnosis such as hypertension, high cholesterol, or heart disease (CDC, 2011c). Household factors includes people who lives in the household (additional children, father, extended family, and/or family friends) and if the mother has ever heard of the "my food plate" a nutritional education program for parents. Resource factors include how close the mother lives to the nearest grocery store, forms of transportation available to the mother, and how far mother has to travel to reach the local health department for her visits to Women, Infants, and Children (WIC). Additional resources factors includes, who does the grocery shopping and who prepares the food in the household. While socioeconomic and insurance status are included conceptually in the basic conditioning factors it is not included in resource factors as every mother/child dyad lives either at or below the level of poverty and they are eligible for Medicaid. Therefore, insurance status is not included as a resource factor. Additionally, while available resources such as food and drink are included conceptually in the basic conditioning factors, it is not included in maternal conditioning factors. Each

mother/child dyad enrolled in the study is eligible for two supplemental state funded programs to provided nutritional resources.

In the State of Michigan children birth to age five and their families who live at or below the level of poverty are eligible for supplemental nutritional programs including Women, Infants, and Children (WIC) and food stamps. The WIC program provides food and nutritional information for the mothers and children who participate in the program. Each child enrolled in WIC is eligible for the following foods every month: four gallons of milk, one pound of cheese, two dozen eggs, 36 ounces of cereal (sweetened, sugar coated cereals are not provided), 16 ounce bag of beans and one 18 ounce jar of peanut butter or two 18 ounce jars of peanut butter or two 16 ounce bags of beans, 128 ounces of pure fruit juice, two loafs whole grain breads and \$6.00 for fruits and vegetables. In addition, WIC participants can participate in Project Fresh, which provides coupons for locally grown fresh fruits and vegetables at local fruit markets (State of Michigan, 2011).

In addition to WIC, mothers and children living below poverty level are also eligible for food stamps, a federally funded program administered through the Michigan Department of Human Services. Eligibility is based on the size of the household, gross income, and certain expenses. Food stamps come in the form of a Bridge Card, similar to an ATM card, and may be used only to buy food items. Food stamps cannot be used for toiletries, paper products, cleaning supplies, alcohol, or tobacco (State of Michigan, 2011).

**Dependent-care agency.** Conceptually, dependent-care agency is a person's acquired ability to know and meet all or some of a dependent's self-care requisites for a person who has a health-associated or health-derived limitation of self-care agency that

has placed the person in a position of social dependency (Taylor & Renpenning, 2011). As part of the three part structure of dependent-care agency is the operational capabilities for performing estimative, transitional and productive operations. Estimative operations refer to the investigations to determine the meaning of the existing conditions related to health (Orem, 2001). Transitional operations are where the judgments and decisions about self-care are made. For this study, the dependent-care agency is termed *maternal beliefs*. At the theoretical level maternal beliefs are defined as beliefs that influence the mother's behaviors in relationship to the child's body weight status. Three types of maternal beliefs are important to this study and include maternal nutritional belief, maternal belief about her child's body weight status, and maternal concern about her child's body weight status. These beliefs influence maternal behavior.

*Maternal nutritional belief.* Included in maternal beliefs is maternal nutritional belief, which represents the estimative operation of dependent-care agency. Maternal nutritional belief is defined as the mother's belief regarding the frequency with which food from each food group should be offered to her child each day. Each mother enrolled in the study will have a baseline nutritional belief that includes information provided by the nurses at the local health department. Every three months the parent or legal guardian of a child eligible for WIC is required to renew their benefits in person at the local health department and receive nutritional counseling. Parents meet with a nurse and/or nutritionist to discuss the child's growth and development, the types of foods the child should be eating and exposed to, portion sizes, and number of servings per day appropriate for the age of each child enrolled. A printed handout of age-appropriate

nutritional information is also provided to reinforce information received at the appointment.

***Maternal beliefs about body weight status.*** Maternal belief about her child's body weight status is defined as a mother's judgments about the child's weight. This belief reflects the transitional component of dependent-care agency.

***Maternal concern.*** Maternal concern is defined as the level of concern a mother has about her child's body weight status. Concern reflects another aspect of the transitional operation of dependent-care agency. The two transitional operations reflect the mother's overall perception of her child's weight and will influence her feeding styles as well as other factors in the mealtime environment.

**Dependent-care.** At the conceptual level, dependent-care is the care provided by the dependent-care agent for a socially dependent person to meet the dependent's therapeutic self-care demand in order to maintain the dependent's life, or to contribute to the dependent's health or well being. Conceptually, there is a relationship between dependent-care agency and dependent-care actions. In the TMICH, dependent-care is termed ***maternal behaviors***. The maternal behaviors are maternal feeding style and food served. Maternal feeding style is defined as the actions or behaviors mothers utilize, either as a deliberate strategy or without thinking, when either feeding the child or restricting the child from food. This definition was developed from and is consistent with Clark and colleagues definition of parental feeding styles (2008). Maternal behavior (i.e., dependent-care actions) is related to health. The maternal behavior of food served is defined as the number of serving the mother serves from the whole grains, protein, milk and dairy, fruits, and vegetable group the child in a 24-hour period.

**Health.** The theory of dependent-care defines health in the same way that it is defined by Orem (2001), in which health is viewed a descriptor of living organisms “when they are structurally and functionally whole or sound” (Orem, 2001, p. 181). Additionally, health has two major dominate themes according to the theory of dependent-care. The first theme is the person or someone else can make judgments about healthy or not healthy. Many of these judgments can be objectively measured. Second, people have their own definition of health and well-being and this definition is formed within a cultural context (Taylor & Renpenning, 2011). At the theoretical level, health is termed *child’s body weight status*. Body weight status is defined as underweight, normal weight, overweight or obese based on the child’s percentile on the BMI-for-age growth curve. In addition to maternal behavior, the child’s own self-care actions, as well as pregnancy and infancy factors will also influence the child’s health outcomes.

**Self-care.** In the proposed study, the conceptual level concept of a dependent’s self-care actions are specified as *child’s behaviors*. Child’s behaviors include screen time, physical activity, and duration of sleep. Within the TMICH physical activity is defined as any bodily movement that promotes gross and fine motor development and improves or maintains health, which is consistent with the definition endorsed by the American Academy of Pediatrics. Screen time is defined as the amount of time the child spends watching television, using the computer, or playing video games in a 24-hour period (American Heart Association (AHA), 2005). Sleep is defined as the amount of time the child spends asleep in a 24-hour period including nighttime sleep and daily naps. Child’s diet is defined as the food and drink the child consumes from the time they arise in the morning until the child goes to sleep at night.



### **Pregnancy and Infancy Factors**

In addition to the child's self-care behaviors, and the maternal dependent-care behaviors that occur during the preschool years, a child's weight status will also be affected by maternal behaviors that occurred during pregnancy or early infancy. As such these behaviors must also be considered when evaluating the effect of the THMIC concepts on a child's health outcomes.

There are several maternal factors and behaviors during pregnancy and infancy that are known to increase the risk of early onset childhood obesity. These include: overweight or obesity during pregnancy, maternal smoking, and maternal breastfeeding.

Overweight or obesity during pregnancy is defined as: a maternal BMI greater than or equal to 25 (CDC, 2011d). Maternal smoking is defined as smoking one to nine cigarettes per day for duration of one month or more before, during, or after pregnancy. Maternal breastfeeding is defined as exclusively breastfeeding the child during infancy for at least the first month of life or more.

### **Philosophical Assumptions of the Theory of Maternal Influence on a Child's Health**

The theory of maternal influence on a child's health was derived from the theory of dependent-care. The PI's beliefs are consistent with the beliefs expressed by Orem in her self-care deficit nursing theory and also consistent with assumptions underlying the theory of dependent-care (Taylor & Renpenning, 2011).

The theory of dependent-care is a corollary to Orem's theory of self-care, as such to understand the theory of dependent-care a person must understand the philosophical assumptions of theory of self-care (Taylor et al., 2001). Orem's work is philosophically based on moderate realism (Banfield, 2001). The PI's ontological and epistemological

philosophical beliefs are congruent with the beliefs of Orem (2001) and Taylor and Renpenning (2011) as expressed below.

The philosophical tenants of moderate realism are consistent with a reciprocal interaction worldview as described by Fawcett (2005), and reflect the philosophical perspective of the PI. In the reciprocal interaction worldview human beings are viewed as being holistic, active, and in constant interaction with their environment (Fawcett, 2005). According to the reciprocal interaction worldview, “Change is a function of multiple antecedent factors” and “Change is probabilistic and may be continuous or may be only for survival” (Fawcett, 1993, p. 58). These views are consistent with moderate realism which views a human as “a powerful agent who acts, directly and in directly on the substance around him, appropriating them and transforming them in countless ways to suit his needs and desires” (Wallace, 1996, p. 13).

The reciprocal interaction worldview is also congruent with moderate realism in the belief that reality is multidimensional (Fawcett, 2005) and can be probabilistically known through both sense and perceptual data. As a result, investigators working within the reciprocal interaction worldview would use both quantitative and qualitative methods to study both subjective and objective phenomena (Fawcett, 1993). The reciprocal interaction perspective about reality is consistent with the views of moderate realism in which there is both sense and intellectual knowledge of the world (Wallace, 1996). Sense knowledge is that which can be known through the human senses, while intellectual knowledge is abstract representations of the mind (Wallace, 1996).

In addition to the views about humans and reality as described above, the PI holds additional ontological views regarding nursing’s other metaparadigm concepts including

health, environment, and nursing. The ontological views of the concept of health for the PI refers to the processes people go through in sustaining life and well-being. Health is the anticipated outcome of both self-care and dependent-care. For the PI the concept of environment refers to the surroundings of human beings and includes the physical, biological, and social surroundings. Environmental factors are one of the basic conditioning factors that influence both the dependent and the dependent-care agent. Nursing refers to human beings with the proper education that qualifies them to help other human beings to know and meet both their own and their dependent's (a) goals for health, (b) self-care needs for maintaining and sustaining life and well-being and, (c) goals during a health-deviation process. The goals of nursing are health and well-being. Nursing accomplishes this through assessment, diagnosis, planning, interventions, and evaluation of a person's ability to meet self-care and dependent-care needs. Nursing becomes an integral part of the TMICH when there is a dependent-care deficit and the dependent-care agents are unable to meet the needs of the dependent.

The epistemological view of the reciprocal interaction worldview is that there are subjective and objective phenomena to be studied. Both qualitative and quantitative methods of inquiry are utilized to study these phenomena. In this worldview, subjective data collected might be a mother's perception of her child's body weight status or concern about her child's weight. This type of data is consistent with the moderate realism perspective of intellectual knowledge (Wallace, 1996). Additionally, in the reciprocal interaction worldview quantitative data such as a child's height and weight are collected and studied. This type of data is also consistent with the view of moderate realism as it represents concrete sense knowledge (Wallace, 1996). Although both

subjective and objective data are examined, within the reciprocal interaction worldview emphasis is place on empirical observations in which quantitative data collected is analyzed objectively by means of descriptive and inferential statistics (Fawcett, 2005). Further, from the reciprocal interaction perspective, truth can only be probabilistically known, as the truth must be regarded within its relationship to the historical time and place (Fawcett, 2005, p. 13).

The concepts of mother/child dyad, maternal conditioning factors, maternal beliefs, maternal behavior, child's body weight status, maternal pregnancy and infant-care factors and child's behavior will be examined within the TMICH. The definition of these concepts is congruent with ontological beliefs of the reciprocal interaction worldview. The proposed descriptive correlational study design and the measures used to assess the concepts and relationships within the theory are consistent with the epistemological beliefs of the reciprocal interaction worldview.

### **Philosophical Beliefs Specific to Self-Care**

**Self-care.** The PI believes, as does Taylor and Renpenning (2011) and Orem (2001), that self-care is a deliberate action, reflecting learned behavior that is learned in the home. Additionally, the PI believes, while the mother is performing the action of dependent-care, the child is learning self-care. Self-care is a regulatory function that a person must perform deliberately to maintain health, well-being, and life. If a person has a limitation and cannot perform self-care activities, another person must perform these self-care activities, resulting in dependent-care. A central belief underlying the TMICH, is the belief that child is starting to be socialized to the self-care behaviors that are necessary for weight control. Within the eating environment, the child is learning eating

as a self-care behavior. Although a preschool-aged child is old enough to feed itself, the child needs to learn the self-care of what foods to eat, how much to eat, what foods are healthy and what foods are not healthy. Additionally, the child is learning the self-care behaviors related to weight control of physical activity and sleep patterns.

**Self-care requisites.** Self-care requisites are the actions required to develop the internal and external conditions needed to maintain integrity of human structure and functioning. When human structure and function is maintained, human maturation and development is supported. When self-care is provided around these universal, and development requisites, and provided effectively, the self-care fosters health and well-being (Orem, 2001; Taylor & Renpenning, 2011). The author believes in the universal self-care requisites, and the proposed study focuses around the requisite of the need to take in food for survival. Children need to learn how to regulate the consumption of food, not only for survival but to maintain a healthy weight. Children learn how to regulate how much and when they eat, for the most part, from the dependent-care action of the mother's maternal feeding style. Additionally, the study will focus on the child's balance between activity and rest. The child's developmental state of industry versus inferiority (Erikson, 1994) provides the conditions in which the dependent-care action of maternal feeding style and the child's balance between rest and activity occurs.

**Dependent-care and self-care deficits.** The PI's beliefs are that children, by virtue of age and developmental state, have many self-care deficits. Therefore, the author believes that dependent-care is a necessary and vital concept in the TMICH. Young children are not developmentally able to perform many self-care behaviors and they need another person to assist them to meet the required the self-care behaviors. Children need

to learn how to perform the needed self-care behaviors to sustain and maintain life. It is through dependent-care that children learn self-care.

### **Summary**

There are several gaps in the literature in relationship to feeding styles and a child's body weight status. Currently not enough is known about how mothers of preschool age children correctly perceive their child's weight and if or how those beliefs affect the mothers feeding behavior. Second, it is unclear which feeding styles mothers who are currently concerned about their child's weight utilize. Third, little has been done to examine feeding styles other than restriction and pressure to eat in relationship to a child's body weight status. Fourth, in the literature there is an inconsistency as to how maternal beliefs and behavior influence a child's actual body weight status. Finally, there is a gap in the literature regarding a guiding theoretical framework for evaluating the effect of maternal beliefs and behavior on a child's weight. The TMICH is a middle-range theory that provides a guiding framework for examining the under-studied effect of maternal beliefs and maternal behavior on a child's body weight status, while also controlling for confounding variables that are known to affect a child's weight.

## CHAPTER 3

### Methods

A lack of physical activity, sugary drinks, increased portions sizes, consuming more calories than are needed for growth and development, and increased screen time are all known factors contributing to the epidemic of childhood obesity (CDC, 2011a). What is unknown is the extent to which maternal beliefs and behavior influence a child's body weight status. Therefore, the purpose of this study was to determine the extent to which maternal beliefs and behavior regarding the child's body weight status influences the child's actual weight beyond the known risk factors for childhood obesity. The central hypothesis of the study was: Maternal beliefs and maternal behavior predict a child's body weight status. To test the central hypothesis and attain the goals of this proposed research study, four specific aims were pursued.

**Specific aim one.** Determine which maternal beliefs (nutritional belief, or perceptions and concern regarding the child's weight) are most predictive of maternal behavior (i.e., feeding style).

**Specific aim two.** Determine the extent to which maternal behaviors predicts a child's body weight status.

**Specific aim three.** Determine the combined effect of maternal beliefs and maternal behaviors on a child's body weight status.

**Specific aim four.** Determine the extent to which the relationship between maternal behaviors and the body weight status of a preschool-aged child is moderated by either the child's behavior and/or pregnancy and infancy factors.

## **Research Design**

The research study used a descriptive-correlational study design with a convenience sample. Approval for the study was obtained from the Wayne State University Institutional Review Board (WSU IRB). In addition, a letter of support was obtained from the data collection site (Oakland/Livingston county Head Start program). Head Start did not require approval other than from the WSU IRB.

## **Subjects and Setting**

### **Sample**

The sample for the proposed study was low-income mother/child dyads. The rate of preschool obesity has nearly tripled in the past several decades and one in seven low-income preschoolers are obese (CDC, 2011a). When obesity starts before the age of five, than early onset obesity is likely to persist into adulthood and tends to be more severe. The home has been identified as one of the most influential factors in a preschool-aged child development of early onset obesity (Clark et al., 2008; Hughes et al., 2005). Around the age of three children stop eating from deprivation and start eating according to the way they are socialized to food and the mealtime environment, which is largely related to parental feeding style (Clark et al., 2008; Hughes et al., 2008; Musher-Eizenman et al., 2007). Children enrolled in the Head Start program and their mothers were recruited as subjects in the study as these children and their mothers represent the population at the highest risk of early childhood obesity.

Based on power analysis (see below), participants for this study included 126 mother/child dyads recruited from a Head Start program located in a Southeastern Michigan county. A convenience-sampling plan was used to obtain the study sample. A



mother was enrolled in the study along with one child. A mother was defined as the child's biological mother, an adoptive mother, or a female legal guardian of the child. Mother/child dyads were included if (a) the child is three to five years of age, (b) the child is enrolled in the Oakland/Livingston county Head Start program, (c) the mother speaks English, (d) the child was enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), and (e) the mother was eligible for food stamps. Exclusion criteria for the study was (a) children diagnosed with a medical condition that can affect growth or weight (i.e. Prader-Willi syndrome), (b) children who were taking chronic oral steroids for a medical condition, (c) children who were taking a medication that affects appetite, (e.g., Ritalin, Concerta, Vyvanse), (d) any child who has a medical condition that can affect swallowing or eating, (e) children who lived with foster parents, (f) children with special needs who were enrolled at the Head Start program, (g) maternal legal guardians/adoptive mothers who did not know the biological mother's pregnancy history for the child (e.g., a child who was adopted from the state foster care system), or (h) mother was pregnant.

**Sample size.** The objective of the study was to determine the extent to which maternal beliefs and behavior regarding the child's body weight status influences the child's actual weight beyond the known risk factors for childhood obesity. The sample size of 127 mother/child dyads was determined by power analysis using G\* Power 3 (Faul, Erdfelder, Lang & Buchner, 2007). Since maternal beliefs and behavior and the effect they have on a child's body weight status was an unexplored area and this was a beginning study, the convention medium effect size was utilized as recommend by Cohen (1992). Power was computed for the multiple regression analysis with power set at 0.8,

an alpha of 0.05, and a medium effect size. Twelve predictor variables were planned for the regression analysis with an outcome variable of the child's BMI. The predictor variables for the regression procedure were maternal nutritional belief, maternal concern, maternal perception of child's weight status, food served, and the six maternal feeding styles. These styles were authoritarian, authoritative, indulgent, control over eating, and prompting/encouraging. The outcome variable was the child body weight status defined as the child's BMI-for-age gender specific percentile. While the primary analysis in the study was multiple regression, chi-square and the logistic regression analysis was also performed. The sample size of 126 was large enough to run the chi-square and logistic regression procedures. The Head Start program that participated in this study enrolled over 500 preschool students; therefore, the population was appropriate to generate the needed sample size of 126 for the analysis. However, if needed Head Start programs in Wayne and Washtenaw County would have been contacted for participation.

### **Setting**

Participants were recruited from the Oakland/Livingston county Head Start program. The Head Start program is located within 75 miles of Detroit, Michigan and serves a racially diverse population including African Americans, Caucasians, Hispanics, and American Indians. Head Start enrolls children from three to five years of age. The program is designed to promote child development in families who live at or below poverty level with an overall goal of increasing school readiness. Ninety percent of the children enrolled in Head Start live at or below poverty level while the remaining 10% are children with special needs (e.g., children with cerebral palsy, mental retardation, congenital birth defects (Michigan Head Start Association, 2010). These children were

not included in the sample. Children with special needs may have dietary restrictions or requirements that may affect their body weight status; some may need to be fed by another person, and some may not be able to chew or swallow and are tube fed. All of these conditions would have affected the independent variable of maternal feeding style.

### **Instruments and Measures**

The theoretical concepts that were evaluated in the study were maternal conditioning factors, maternal beliefs, maternal behavior, child's body weight status, child's behaviors, and pregnancy and infancy factors. To obtain the data, six different instruments were utilized including: (a) a demographic data sheet (DDS), (b) a maternal beliefs survey (MBS), (c) a Caregiver Feeding Style Questionnaire (CFSQ), (d) a Parental Feeding Style Questionnaire (PFSQ), (e) a child activity Survey (CAS), and (f) a Child and Diet Evaluation Tool (CADET).

### **Maternal Conditioning Factors**

At the theoretical level, the maternal conditioning factors are conditions or circumstances that influence how the mother meets the child's dependent-care demand. These were maternal demographic factors, health factors, household factors, and resource factors. Maternal demographic factors were operationalized as maternal level of education, maternal race, maternal ethnicity, and maternal age. Health factors were if the child's doctor has expressed concern regarding the child's weight and if the mother has obesity related type II diabetes diagnosis. Household factors included who lives in the household (additional children, father or significant other, extended family or friends) and if the mother had ever heard of the nutritional educational program "my food plate." Resource factors included how close the mother lives to the nearest grocery store, forms

of transportation available to the mother, and how far mother has to travel to reach the local health department for her visits to WIC. Additional resource factors included who does the grocery shopping and who prepares the food for the household. The maternal conditioning factors data were recorded on the investigator created demographic data sheet. Additionally, the child's conditioning factors of age and gender were obtained on the demographic data sheet.

### **Maternal Beliefs**

Of significant interest in the proposed study, was the effect of maternal beliefs on maternal behavior and on a child's body weight status. At the theoretical level, dependent-care agency was conceptualized as maternal beliefs. In the study, three maternal beliefs were examined.

Maternal nutritional belief was operationalized, as the mother's belief regarding the frequency with which food from each food group should be offered to her child each day. To evaluate this concept mothers were asked on the MBS in questions one through nine how many servings of protein, milk and dairy, fruits, vegetables, whole grains, sweetened drinks, juice, sweets, and fats she believes the child needs in a day. Each response for questions one through five had a choice ranging from one to five. The PI then calculated the mother's nutritional belief score. A mother was given one point for each correct response to the number of servings the child needs for the whole grains, milk and dairy, fruit, vegetable, and protein group. The total points were then be divided by five to determine a percentage score for mother's nutritional belief.

The second maternal belief that was examined was the mother's belief about the child's body weight status. Question ten on the MBS asked the mother to make a

judgment about her child's weight as very underweight, somewhat underweight, just the right weight, somewhat overweight, or very overweight.

The last maternal belief that was examined is maternal concern about the child's weight. Maternal concern was defined as the mother's current level of concern about her child's weight. Maternal concern was assessed in question 11 on the MBS. The mother was asked how strongly she agrees or disagrees on a five point likert scale with the statement "I am currently concerned about my child's weight." Question 12 asked the mother "If you are currently concerned about your child's weight are you concerned the child is:" with four possible responses, very underweight, slightly underweight, slightly overweight, or very overweight. Question 13 asked mother if she thinks the child is a picky eater or a good eater. The Flesch-Kincaid reading level of the maternal beliefs survey was fourth grade.

### **Maternal Behavior**

At the conceptual level, dependent-care actions are actions taken by the dependent-care agent to meet self-care needs the dependent is unable to meet for themselves. For this study, dependent-care actions were theoretically termed maternal behaviors and the maternal behaviors of interest were maternal feeding style and food served. Maternal feeding style was defined as actions or behaviors mothers utilize, either as a deliberate strategy or without thinking, when either feeding the child or restricting the child from food. Maternal behavior of feeding style was evaluated using two instruments, the Parental Feeding Style Questionnaire (PFSQ), and the Caregiver Feeding Style Questionnaire (CFSQ). In this study, a total of eight maternal feeding styles were evaluated, four from the CFSQ and four from the PFSQ. Food served was defined as the

number of serving the mother serves from the whole grains, protein, milk and dairy, fruits, and vegetable group the child in a 24-hour period. Food served was measured on the Child and Diet Evaluation Tool (CADET).

**Caregiver feeding style questionnaire.** The CFSQ was developed to measure parental feeding styles among low-income families (Hughes et al., 2008). Unlike other tools that assess specific feeding styles, the CFSQ assesses an overall feeding practice of the parents of low-income children. The tool was developed with low-income preschool-aged children enrolled in a Head Start program. The CFSQ was developed to measure parental feeding styles that are consistent with the two dimensions of general parenting styles, demandingness and responsiveness as developed by Macoby and Martin in 1983. The CFSQ contains 19 questions that measure parent's demandingness and responsiveness in relationship to feeding the low-income child. Responses are measured using a 5-point Likert scale with the choices of never, rarely, sometimes, most of the time, or always. Demandingness is how much the parent encourages the child to eat and responsiveness is the measure of how the parent gets the child to eat (Hughes et al., 2008).

Seven of the 19 questions were child-centered feeding questions. Child-centered feeding is a feeding style that encourages children to eat from their own internal cues. Examples of child-centered feeding are reasoning with the child and complimenting the child. The remaining 12 of the 19 questions were parent-centered feeding question. Parent-centered feeding encourages children to eat based on external cues. Examples of parent-centered feeding are threatening the child and punishing the child.

Each answer on the CFSQ was assessed a point value. A response of never was one point, rarely was two points, sometimes was three points, often was four points, and always was five points. The first step in scoring the CFSQ was to determine the median split for demandingness score and responsiveness score for the sample. To obtain the demandingness median split, the PI obtained the demandingness score for each participant. Demandingness score was calculated determining the mean score of all 19 questions. The responsiveness score was determined by calculating the mean score for the child-centered questions (questions 3, 4, 6, 8, 9, 15, 17) over the total mean of demandingness. Based on each participants mean score for demandingness and responsiveness, the median split was then determined for the sample.

Each participant's mean score was then compared to the median split for responsiveness and demandingness. If the participants mean score fell below the median split for demandingness, the participant was classified as low demandingness. If the participants score fell above the median split for demandingness the participant was classified as high demandingness. The participants were then evaluated for responsiveness. If the participant fell below the median split for responsiveness the participant was classified as low responsiveness. If the participant fell above the median split, the participant was classified as high responsiveness. Participants were then categorized into one of four feeding styles based on the scores for demandingness and responsiveness. The four feeding styles are authoritarian, authoritative, indulgent, and uninvolved (Hughes, et al., 2005).

The authoritarian feeding style is high demandingness and low responsiveness. Authoritarian mothers encourage children to eat by physically struggling with them,

using punishments and using rewards (high demandingness), but do so with little encouragement (low responsiveness). Authoritative feeding style is a high demandingness and high responsiveness feeding style. Authoritative mothers encourage eating by complimenting the child, reasoning with the child and allowing the child to pick their own food and snack within an appropriate choice of foods (high responsiveness). Authoritative parents actively encourage their children to eat (high demandingness). Indulgent feeding style is low demandingness and high responsiveness. Indulgent mothers make few demands on the child to eat (low demandingness). However, when they do make demands they are supportive and nondirective (high responsiveness). Lastly, the uninvolved feeding style is low demandingness and low responsiveness. Uninvolved mothers make very few demands on the child to eat (low demandingness). However, any demands the mother does make on the child to eat is not encouraged (low responsiveness) (Hughes et al., 2008)

When the CFSQ was developed two analyses were utilized to evaluate convergent validity. The CFSQ was compared to the Parenting Dimensions Inventory (PDI-S) and the pressure to eat, monitoring, and restriction subscales from the Child Feeding Questionnaire (CFQ). Both were significant, PDI-S,  $F(27,602) = 2.26, p < 0.001$ ; CFQ,  $F(9,518) = 3.17, p < 0.001$ . Coefficient alpha for the parent-centered items is 0.86 and for the child-centered items is 0.71 (Hughes et al, 2004). Test-retest reliability of the CFSQ was established using 25 participants who completed the questionnaire twice. The participants completed the questionnaire for a second time 7 to 14 days after initial completion of the questionnaire. The Pearson's correlation for the parent-centered feeding was 0.85. Pearson's correlation for the child-centered feeding was 0.82 (Hughes et al.,



2005). The CFSQ has a Flesch-Kincaid reading level of sixth grade. The CFSQ has been previously used with mothers of children ages three to five years with similar racial/ethnic/socioeconomic backgrounds as in the Head Start program (Hughes et al., 2006; Hughes, et al., 2008). Therefore, it was an appropriate instrument to use with the planned participants in the study.

**Parental feeding style questionnaire.** In addition to the CFSQ, the Parental Feeding Style questionnaire (PFSQ) was utilized to assess maternal feeding style. Unlike the CSFQ, which measures parental feeding styles overall as a reflection of parenting style, the PFSQ will evaluate a mother's specific feeding style reflecting specific ways mothers use food with their child. The PFSQ contained 27 questions with four subscales measuring instrumental feeding, control over eating, emotional feeding, and prompting and encouragement. The instrumental feeding subscale contained four items. An instrumental feeder uses food as a reward for good behavior and takes away food as a punishment. An instrumental feeder uses treats or rewards to bribe the child to eat their main meal. Ten items were contained in the control over eating subscale. A mother who utilizes a control over eating style determines when, where, what and how much her child should eat. The emotional feeding style subscale contained five items. A mother who utilizes an emotional feeding style uses food to comfort her child. She offers her child food if the child is upset, has been hurt, is worried, angry, or bored. Finally, there are eight items in the prompting and encouragement subscale. A mother who utilizes a prompting and encouraging feeding style encourages her child to try new foods, enjoy their food, and to look forward to eating. These mothers praise the child for eating what she gives the child (Wardle, Sanderson, Guthrie, Rapoport, & Plomin, 2002).

Each of the 27 items used a five-point Likert scale response ranging from “never” to “always.” Each answer was assessed a point value. A response of never was one point, rarely was two points, sometimes was three points, often was four points, and always was five points. Five questions in the control over eating subscale were reversed scored. Each subscale total score was then obtained using the point values listed above. A mean score was obtained for each subscale by dividing the total score for the subscale by the number of questions in the subscale. Based on the mean score, a mother’s dominant feeding style was determined and the mother was classified into a category of instrumental feeding, control over eating, emotional feeding, or prompting and encouragement (Wardle et al., 2002).

The PFSQ has been previously used with mothers of children age’s three to six with a variety of socioeconomic status indicators including low-income children and those with a variety of racial backgrounds (Carnell & Wardle, 2007; Wardle et al., 2002). The instrument has been shown to have good internal consistency and test-retest reliability. Cronbach’s alphas for the scales are as follows: instrumental feeding subscale ( $\alpha = 0.67$  to  $0.85$ ), control over eating subscale ( $\alpha = 0.77$  to  $0.81$ ), emotional feeding ( $\alpha = 0.65$  to  $0.88$ ), and prompting and encouraging subscale ( $\alpha = 0.69$  to  $0.80$ ) (Carnell & Wardle, 2007; Wardle et al., 2002). Sending out a second questionnaire to participants two weeks after the initial questionnaire assessed test-retest reliability. The return rate for the second questionnaire was 75%. The test-retest reliability for the four scales were instrumental feeding ( $r = 0.82$ ,  $p < 0.001$ ), control over eating ( $r = 0.83$ ,  $p < 0.001$ ), emotional feeding ( $r = 0.76$ ,  $p < 0.001$ ), and prompting or encouragement to eat ( $r = 0.76$ ,

$p < 0.001$ ) (Wardle et al, 2002). The PFSQ has a Flesch-Kincaid reading level of third grade.

**Feeding style classifications.** For this study, each feeding style, from both the CSFQ and PFSQ, was classified as a healthy or unhealthy feeding style. Ten pediatric experts were asked to evaluate the eight different feeding styles. The experts included: six nationally certified Pediatric Nurse Practitioners, one nationally dual certified Pediatric and Family Nurse Practitioner, one board certified Pediatrician, and two nationally certified Family Nurse Practitioners whose practice focus is in pediatric care. A brief description of each feeding style was provided to the expert. The experts were then asked to classify the feeding style as to whether it would lead to a healthy body weight status or an unhealthy body weight status. All 10 experts agreed on the classification of the feeding styles. The healthy feeding styles were: authoritative, control over eating, and prompting and encouraging. The unhealthy feeding styles were: authoritarian, indulgent, uninvolved, instrumental feeding, and emotional feeding. It was expected that the mothers would be classified as using either a healthy or unhealthy feeding style on both the CFSQ and PFSQ, and data analysis was planned based on this expectation. However, the mothers were classified as healthy on one questionnaire and unhealthy on the other questionnaire and separate analysis of each feeding style scale was conducted. Additionally, the prompting/encouraging feeding style was perfectly inversely correlated to the control over eating feeding style. Therefore, the control over eating feeding style was reclassified as unhealthy.

**Child and diet evaluation tool.** The food the mother serves the child was evaluated using the CADET, a 24-hour checklist that is easily utilized by non-specialists

such as parents or teachers. The CADET assesses all aspects of food and drink for a 24-hour period. The CADET was designed and tested with participants in the United Kingdom with a range of socioeconomic and racial backgrounds (Cade, Frear, & Greenwood, 2005).

The CADET is divided into sections A to R. Section A through Q are a 24-hour check list for mother to check off the food and drink the child is served during the 24-hour period. These sections are divided into eight columns. The first column contains a list of food choices with several options contained under each section. The seven remaining columns are divided into sections, one each for breakfast, lunch, and dinner, and four columns for snacks. This format allows the mother to check when and how often the child was served each type of food and drink. The sections on the CADET are as follows:

- Section A Cereals: five options ranging from cold to hot cereal with several examples such as Rice Krispies or high fiber cereals such as shredded mini-wheat.
- Section B Sandwich, Bread, Cake, and Biscuits: 10 options choices ranging from crackers to biscuits to cakes to pies.
- Section C Spreads, Sauces, and Soup: seven options including butter, margarine, gravy, mayonnaise, and soup.
- Section D Cheese and Eggs: six options ranging from hard to cottage cheese, fried eggs, scrambled eggs or eggs sunny side up.
- Section E Chicken and Turkey: three options including sliced, nuggets, and in a sauce.

- Section F Other Meats: nine options including stews and casseroles, burgers, pork chops, ham, bacon, sausage rolls, liver, and kidney.
- Section G Fish: five options including fried or non-fried fish, fish fingers, whitefish, and oily fish such as tuna or salmon.
- Section H Vegetarian: three options including vegetable pie, pasties, and vegetable mince.
- Section I Pizza, Pasta, and Rice: eight options including pizza, white and fried rice, plain pasta, pasta with tomato sauce, cheese sauce, or meat sauce.
- Section J Dessert, Pudding: three options including pudding, ice cream, and frozen yogurt.
- Section K Sweets: four options including candy bars, chocolate, nuts, and toffee.
- Section L Vegetables and Beans: 18 options including stir fried vegetable, cucumbers, broccoli, corn, lettuce, lentils, peppers, and baked beans.
- Section M Potatoes: two options including potato (broiled or baked) or chips
- Section N Fruit: 13 options including strawberries, bananas, kiwi or oranges, fruit salad, and dried fruit.
- Section O Nothing to eat
- Section P Drinks: seven options including milk, tea, coffee, sugary drinks, unsweetened drinks, juice, and water.
- Section Q contains 10 questions that assess details about the amounts and types of food the child eats in an average day. For example, one question

assesses how much of a whole piece of fruit a child eats when they have fresh fruit or how much milk the child drinks in a typical day (Cade et al., 2005).

The CADET was designed to record all food and drink consumed over a 24-hour period. The CADET was compared to a 24-hour semi-weighted food diary. The 24-hour diary was completed on the same day as the checklist and covered the same 24-hour period. Correlations for the checklist and 24-hour food diary ranged from  $r = 0.41$  to  $0.89$  and nutrients ranged from  $r = 0.41$  to  $0.68$ . The CADET correlated better than most tools against a 24-hour intake diary, which usually correlate at  $0.30$  to  $0.40$  (Cade et al., 2005). The CADET was tested for repeatability with a subgroup of 30 parents. Separate checklists and food diaries were used on two separate days. “The second CADET gave values slightly closer to the 24-hour diary” (Cade et al., 2005, pg.14). However, these results may be related to the parent’s familiarity with the instruments. The two CADETs did not correlate well to each other, but were not expected to as they were measuring food intake on different days. However, the instruments did correlate well with the 24-hour diary taken on the same day (Cade et al., 2005).

The CADET was modified for use in this study. The CADET was developed in the United Kingdom and contains foods that are common to the United Kingdom. Therefore, in sections A through Q additional examples of common United States (U.S.) foods such as fish sticks, oatmeal, and grits were added to the appropriate sections. Additionally, in section R two questions assess the amount of milk and juice the child drinks in an average day. The response choices were in the Imperial system such as one pint or two pints. These two questions were be modified to the “USA system.” The response choices were in cups as opposed to pints. Lastly, another modification was

made to questions regarding the type of milk the child drinks on an average day and the type of bread the child eats on an average day. The responses reflected the fat content and bread choices in the United Kingdom. The types were changed to reflect the U.S. definition of fat content in milk that is familiar to mothers. The choices of milk read whole milk, 2% milk, 1% milk, skim milk, lactose free milk, and other. The question regarding the type of bread the child eats on an average day was changed to reflect common U.S. bread types of white, white with added fiber, whole wheat, whole grain bread, or other.

The CADET provided a great deal of descriptive data. The CADET provided a gross number of times the child was served a particular food or drink during the day. This gross number however, will allowed the PI to quantify the percentage of time a mother met the USDA recommendations per day of the five food groups. Therefore, the "food served" score that was calculated provides a gross estimation of how closely the mothers met the recommended frequency of offering a child a food from each food group. The food served score was calculated such that if the frequency of the food being offered was equal to the USDA daily frequency recommendations the mother received one point, if the frequency was above or below the recommendation the mother was given a zero. The points from each food group were totaled and then the total points were divided by five to obtain a percentage. The food served percentage only represents the percentage of time the mother presented the child with a food from the food groups in the correct frequency, but does not measure the serving size of each food offered.

**Child's body weight status.** In the study, a child's health was conceptualized at the theoretical level as the child's body weight status. The child's body weight status was

operationalized as the child's BMI-for-age percentile on a gender specific pediatric growth curve. For the chi-square and logistic regression analysis, BMI was categorized into healthy and unhealthy weight. A child whose BMI-for-age and gender that is less than the 5<sup>th</sup> percentile and greater than the 85<sup>th</sup> percentile was classified as having an unhealthy weight (CDC, 2011a). A child whose BMI-for-age and gender is between the 5<sup>th</sup> and 84<sup>th</sup> percentile on the BMI-for-age and gender growth curve was classified as having a healthy weight (CDC, 2011a). A child's height and weight was obtained from the child's Head Start record and recorded on the demographic data sheet. For the multiple regression procedures the child's BMI-for-age percentile was the outcome variable. The BMI-for-age percentile data was not non-linear. None of the child's BMI-for-age percentile fell below the fifth percentile. The data was linear. Log transformation was not performed

### **Cofounders**

There are factors that are known to contribute directly to a child's body weight status and could confound the relationship between maternal behavior and a child's body weight status. The known contributing factors are a child's diet, child's activity level, the amount of sleep the child gets, and the amount of time the child spends in front of a screen. Additionally, maternal overweight or obesity at the time of pregnancy, maternal smoking before, during, or after pregnancy, and a lack of breastfeeding the child during infancy are known contributing factors that contribute to a child's body weight status.

**Pregnancy and infancy factor cofounders.** Pregnancy and infancy factors cofounders were maternal weight during pregnancy, smoking, and a lack of breastfeeding. Questions related to maternal behavioral factors were assessed on the



demographic data sheet. Questions were pulled from the Centers for Disease Control Pregnancy Risk Assessment Monitoring System and were modified to read “your child” instead of “new baby” (PRAMS) (CDC, 2010). For example, on the PRAMS survey, a question read “ Did you ever breastfeed or pump breast milk to feed your new baby after delivery, even for a short period of time?” The question was modified to read “Did you ever breastfeed or pump breast milk to feed *your child* after delivery, even for a short period of time?” According to the CDC website (2010), when questions from the PRAMS survey are only used in one state, permission needs to be obtained from the state’s PRAMS Primary Investigator. Permission to use and modify these questions was obtained from the state of Michigan PRAMS Primary Investigator, Violanda Brigorscu, per a phone conversation on 10/14/2010.

Seven questions from the PRAMS survey were utilized to assess the maternal cofounders. The first question assessed the mother’s weight at the time of her pregnancy. The second question assessed how tall the mother is without shoes. These two questions allowed the PI to determine the mothers BMI at the time of pregnancy. The third and fourth questions assessed if the mother ever breastfed the child and if so, how long did she breastfeed the child. Mothers were then classified as a breast-feeder (breast fed for greater than one month) or bottle-feeder (either never breast-fed or breast-fed for less than one month). The last three questions assessed if the mother smoked and how much the mother smoked before, during, and after pregnancy. An example of these questions is “in the three months before you got pregnant with this child, how many cigarettes did you smoke on an average day? (A pack of cigarettes contains 20 cigarettes).” The mother then had the option of picking a range of cigarettes she smoked per day from more than 41

cigarettes per day to I never smoked. This question was repeated to assess smoking during the last three months of pregnancy and smoking after the pregnancy. These three questions were scored as a group. Additionally, the mother was asked if she smoked, how long did she smoke. If the mother smoked one to nine cigarettes daily for one month or more before, during, or after pregnancy, the mother was classified as a smoker. If the mother smoked for less than one month before, during, or after pregnancy the mother was classified as a non-smoker.

**Child behavior cofounders.** In addition to pregnancy and infancy factors, child behaviors were potential cofounders. Child behaviors are the actions a child takes that influence their body weight status. Child behaviors that are known to influence body weight status include physical activity, screen time, sleep, and child's diet (CDC, 2011). Physical activity is bodily movement that enhances gross and fine motor development and maintains or enhances fitness. For the preschool-aged child, physical activity includes vigorous play or guided interactive play (AAP, 2003). Screen time was defined as the amount of time the child spends watching television, using the computer, or playing video games in a 24-hour period (AHA, 2005). Sleep was defined as time the child spends asleep in a 24-hour period including nighttime sleeping and daily naps. Child behaviors were assessed on the investigator created child activity survey (CAS).

The investigator-created CAS included ten questions. The first question assessed the number of days per week that the child engaged in sixty minutes or more of physical activity. The second question assessed how many hours of sleep at night the child has on an average night. The third question assessed if the child takes a daily nap. The fourth question assessed how long the child sleeps, on average, if they take a daily nap.

Questions five through nine assessed the child's screen time by assessing time spent (a) in front of a television, (b) playing video games, (c) using a computer, (d) playing with an iPod, Nintendo DS or other hand held game device, and (e) playing games or watching videos on a cell phone. Each question had a numeric response of number of minutes or hours depending on the mother's answer to the question. The Flesch-Kincaid reading level of the child activity survey was sixth grade.

All the instruments in the study were pilot tested with the first five participants. According to Polit and Beck (2012), this allowed for an opportunity to identify parts of any of the instruments that were difficult to read, difficult to understand, that could be misinterpreted, or that participants might find offensive. Based on responses from the participants, the PI did not need to make modifications. The participants did not find any of the questions offensive, they were easy to understand, and they were interpreted correctly. These participants were included in the sample and data collection continued.

### **Data Collection Procedures**

This study began after it was reviewed and approved by the WSU IRB and continued until the desired sample size of 127 mother/child dyads was reached. The PI of this study was the sole data collector.

**Recruitment Strategy.** To recruit participants to the proposed study three procedures were used:

**Flyers:** Flyers were posted on each entrance and classroom door of the Oakland/Livingston County Head Start building. The flyers indicated the time, date, and place of an optional information session where mothers could meet with the PI to learn

more about the study. The flyers indicated the days and times when the PI was available at Head Start to discuss the study privately with potential participants.

**Information Session:** Potential participants could attend an information session, which was conducted at the Head Start building. During the information session, the PI discussed the details of the study, answered questions, informed mothers that participation was strictly voluntary, and told them that the decision to participate or not will not affect their child's enrollment at Head Start in any way. One mother decided to participate and the mother/child dyad met the inclusion criteria, informed consent was obtained and a research packet was given to the mother. The other mothers that attended wanted time to think about participating before agreed to participate.

**Personal Invitation:** As indicated on the flyers, the PI was at Head Start Monday through Thursday mornings as well as Monday and Thursday midday and afternoons during the student drop-off and pick-up times. All mothers who expressed an interest in participating were given more information about the study and invited to participate in the study. As with the informational session, the PI explained that participation was strictly voluntary, and the decision to participate or to not participate did not affect a child's enrollment at Head Start in any way. If the mother agreed to hear about the study, she was taken to a private room where study details were explained and any questions she may have had were answered. If the mother decided to participate and the dyad met the inclusion criteria, informed consent was obtained and the mother was given the research packet.

For all who agreed to participate, the mother's name and her child's name were recorded on a numbered master list that will be shredded at the closure of the study. If the

mother had more than one child enrolled in the Head Start program, the mother was asked to complete the research packet for the youngest child only. This was done since it is not yet known if mothers use the same or different feeding styles with their children, and the youngest child's eating habits and food preferences are less developed than an older child's.

After informed consent was obtained and the names of the mother and her child were recorded, the mother was given a numbered research packet that corresponds to the master list. Each research packet contained (a) a welcome letter, (b) an investigator created demographic data sheet, (c) an investigator created maternal beliefs survey (MBS), (d) an investigator created child activity survey (CAS), (e) a Caregiver Feeding Style Questionnaire (CFSQ), (f) a Parental Feeding Style Questionnaire (PFSQ), (g) a Child and Diet Evaluation Tool (CADET), (g) a copy of the informed consent, and (h) a list of dates and times the PI was available to collect the packets, answer any question the mother may have and distribute the incentive of a \$15.00 Speedway gift card. Once the packets had begun to be distributed, flyers were posted on the front doors of Head Start and on the classroom doors to remind mothers of the times and days the PI was at Head Start to collect the research packets.

**Collection Procedures.** Mothers completed all the study instruments at home then returned the research packets to the PI during the drop-off and pick-up times at Head Start. The PI was at the Oakland/Livingston county Head Start on Monday through Thursday mornings, and also on Monday and Thursday middays, and afternoons to collect the completed packets. Data collection did not occur on Fridays, as the students are not in session on Fridays.

Mothers returned the research packets to the PI in a private room at the Head Start building. The PI asked if the mother had any questions about the research packet or other questions or concerns. The PI asked each mother if anyone helped her complete the instruments, and if so who provided the help. Fifteen mothers had someone help them complete the research packet. The people who helped the mothers were either fathers or significant others. Once the PI had addressed all of a mother's questions and/or concerns the mother was given a \$15.00 Speedway gift card as compensation for the time she took to fill out the surveys. At that time she was also enrolled into a drawing for one of two \$75.00 Speedway gift cards. The two \$75.00 Speedway gift cards were handed out after the drawing on the last day of school. Speedway gift cards were selected as incentives based on the recommendation from the contact person at Head Start. Given the current cost of gas, a Speedway gift card were beneficial to the mothers and a Speedway station is located close to the Head Start building.

Once the research packets were returned, the PI obtained the child's height and weight from the child's Head Start file. The data was recorded on the demographic data sheet and was used to calculate the child's BMI. This was done using the CDC's website for calculating childhood BMI, which applies a calculation based on the day the measurements were taken and the child's birth month and year. It provided a BMI-for-age percentile based on gender and calculated age. The CDC website provided a more age-specific BMI than would have been possible if calculated by SPSS.

### **Protection of Human Subjects**

The study involved mothers completing several surveys and recording her child's food intake for one day. The child was not an active participant in the study. The PI

accessed the child's Head Start file only to obtain child's current height and weight. Because the PI had to connect the maternal information with information about the child contained in the Head Start files, written informed consent was obtained from the mother. A master list was kept to record the number of surveys returned, mother's name, the child's name, and to have the mother initial that she received the gift card from the PI. The master list, the research packets, and the informed consents were all stored separately in separate locked file cabinets in a locked office. The PI had the only key to the office.

All participants were compensated for their time with a \$15.00 Speedway gift card. Each mother who participated in the study was entered into a drawing for one of two \$75.00 Speedway gift cards.

It was unlikely that the mothers or children included in this study would directly benefit from their participation. In the future, mothers and children may benefit if the study determines how maternal beliefs affect maternal behavior related to a child's body weight status. Additionally, in the future, children may benefit if maternal feeding styles that lead to early onset obesity are identified. Identification of these factors could be used to create early intervention programs for mothers with children who may be at risk for obesity.

The child was not directly involved in the study and therefore, there was no risk to the child. The risk to mothers who participated in this study is minimal. There was a risk of loss of confidentiality and a possible psychological risk.

The mother's confidentiality was protected by having the mother discuss the research packet with the PI in a private room with the door closed to prevent other participants from hearing the discussion. Additionally, all data was kept in a locked

cabinet in a locked office. The PI had the only key to the office and was the sole data collector in the study. Only the PI and the approved data entry person entered the participants' responses into SPSS. The PI and the approved data entry person were the only people with access to the participants' responses.

There was slight possibility of a psychological risk to the mother. The mother could have become anxious about how she is feeding the child or the foods she is feeding the child. When this occurred the PI is a Certified Pediatric Nurse Practitioner who answered the mother's questions. Additionally, the PI had a list of local pediatricians the mother could contact if the PI cannot answer all the mothers questions or she had further concerns. If a mother was uncomfortable answering any question, she has the right not to answer or could withdraw from the study at any point. The risks to the mother participants were minimal as the research was on individual characteristics and behaviors. Therefore, the study met the two criteria for an expedited review (WSU IRB, 2011). All required information was be submitted to the WSU IRB for approval prior to the start of data collection. Approval was obtained from WSU IRB and WSU graduate school.

### **Data Analysis**

#### **Data Management and Preliminary Data Analysis**

All data was analyzed using the most recent version of the Statistical Package for the Social Sciences (SPSS). Power was computed for the multiple regression analysis with power set at 0.8, an alpha of 0.05, and a medium effect size for 12 predictor variables. Descriptive statistics were utilized to characterize the data by summarizing the data into easy to understand terms. The summarizing is done without losing or distorting the data. Descriptive statistics includes tables, frequencies, percentages, and means.



Inferential statistics were utilized to provide predictions about the relationships between maternal beliefs and behavior and the child's body weight status based on the sample recruited from the Head Start population.

### **Descriptive Analysis**

Once data screening has been completed, descriptive analysis were done to characterize the sample population (e.g., range of ages, levels of education), and well as provide information regarding scores on the various instruments.

**Sample characteristics.** Means and standard deviations were provided for the maternal factors of mother's age and level of education. The maternal conditioning factors of demographic factors, health factors, household factors, and resource factors were described using percentages.

**Instruments and measures.** The maternal beliefs of concern about a child's weight, belief about a child's weight status, and nutritional beliefs were described in percentages. The maternal behavior of maternal feeding styles will be described using the percentage of mothers in each category of feeding style. A mean and standard deviation was provided for the child's BMI. The pregnancy and infancy factors of maternal overweight or obesity at time of pregnancy were described with the mean BMI and standard deviations for the mothers. The other two pregnancy and infancy factors of smoking and breastfeeding were described using percentages. The child's behavior of physical activity was described using a percentage. Means and standard deviations were provided for the child's activity, sleep, and screen time. Lastly, food and drink the served to the child was described in terms of mean number of vegetables, fruits, proteins, milk and dairy, sweets, and sweetened drinks consumed.

### Analysis of Specific Aims

**Specific aim one.** Determine which maternal beliefs (i.e., nutritional belief, perceptions and concerns regarding the child's weight) are most predictive of maternal behavior.

**Research question 1a.** Does maternal level of concern differentially predict healthy/unhealthy maternal feeding styles?

**Research question 1b.** Does a mother's perception of a child's body weight status differentially predict maternal feeding style?

**Research question 1c.** Does maternal nutritional belief differentially predict healthy/unhealthy maternal feeding style?

The primary analysis for specific aim one was logistic regression. Logistic regression was appropriate as the outcome variable was discrete. The predictor variables were maternal nutritional belief, maternal level of concern and perception of body weight status. The predictor variable of maternal nutritional belief was a percentile score. The predictor variable of maternal level of concern was measured on a five point Likert scale from strongly disagree to strongly agree. Maternal perceptions of the child's body weight status was measured as very underweight, somewhat underweight, just the right weight, somewhat overweight, and very overweight. Logistic regression was utilized to determine if maternal nutritional belief, maternal level of concern or maternal perception of the child's body weight status was predictive of the dichotomous outcome of healthy/unhealthy maternal feeding style.

**Specific aim two.** Determine the extent to which maternal behaviors predict a child's body weight status.

**Hypothesis 1.** Mothers who utilize a healthy feeding style will have children with a BMI within a healthy range.

The variables of BMI and feeding style were dichotomized into healthy/unhealthy weight and healthy/unhealthy feeding styles, respectively. Analysis of frequency (chi-square test) was used to determine the likelihood of having a healthy BMI given a healthy feeding style. Body mass index was categorized into healthy weight and unhealthy weight. A healthy BMI was one that is greater than the 4<sup>th</sup> percentile or less than the 85<sup>th</sup> percentile on the BMI-for-age growth curve. An unhealthy BMI was one that is less than the 5<sup>th</sup> percentile or equal to or greater than the 85<sup>th</sup> percentile on the BMI-for-age curve.

**Research question 2a.** Which of the eight different feeding styles are most predictive of child's body weight status?

This research question was analyzed using multiple regression, which is appropriate when the outcome variable is continuous and the predictor variables are either continuous or discrete. For this analysis, the predictor variables were the eight different feeding styles. These were dummy coded using the uninvolved feeding style as a reference variable. These were coded: authoritative = 1, not authoritative = 0, authoritarian = 1, not authoritarian = 0, indulgent = 1, not indulgent = 0, uninvolved = 1, not uninvolved = 0 for the CSFQ and for the PFSQ control over feeding = 1, not control over feeding = 0, and prompting and encouraging = 1, not prompting and encouraging = 0. None of the mothers were instrumental or emotional feeders. The outcome variable was the BMI-for-age percentile, which was continuous variable. The data was linear and did not need to be transformed.

**Research question 2b.** What is the relationship between the food served and the child's BMI?

This research question was analyzed using multiple regression, which was appropriate as the outcome variable was continuous and the predictor variables were continuous or discrete. For this analysis, the predictor variable was the percentage of time the mother met the daily-recommended servings from the five food groups in a 24-hour period. The outcome variable was the child's BMI.

**Specific aim three.** Determine the combined effect of maternal beliefs and maternal behaviors on a child's body weight status.

This aim was analyzed using hierarchical multiple regression. The predictor variables were the three maternal beliefs. Maternal nutritional belief was a percentage score based on the percent of time the mother met the daily recommendations for the five food groups in a 24-hour period. Maternal concern was measured on a five point Likert scale from strongly disagree to strongly agree and the data will be treated as continuous. Maternal perception of the child's body weight status was measured as very underweight, somewhat underweight, just the right weight, somewhat overweight, and very overweight. The other predictor variables were the maternal feeding styles, which were dummy coded as described in Aim 2. The outcome variable was the child's body weight status, which was the BMI-for-age percentile on the growth curve. The outcome variable did not need to be transformed, as the data was linear. In hierarchical multiple regression, the predictor variables were entered as specified by PI in the study. The order of entry was determined based on the guiding theoretical framework. Entering the variables one at

a time allowed the PI to determine the importance of each predictor variable while controlling for the other variables in the equation.

**Specific aim four.** Determine the extent to which the relationship between maternal behaviors and the body weight status of a preschool-aged child is moderated by either the child's behavior and/or pregnancy and infancy factors.

**Research question 4a.** Is the relationship between maternal feeding style and the BMI of a preschool-aged child moderated by the child's screen time, sleep duration, or physical activity?

For this research question the planned analysis was moderated regression analysis. The predictor variable was feeding style, either healthy or unhealthy. The outcome variable was the child's BMI-for-age percentile. The moderators were the child's screen time, sleep duration, and physical activity. The moderators were measured on a continuous scale. The interaction terms were feeding style X screen time; feeding style X sleep duration; and feeding style X physical activity. If the interaction variable was significant, moderation occurred.

**Research question 4b.** Is the relationship between the maternal behavior of food served and the BMI of a preschool-aged child moderated by the child's screen time, sleep duration, or physical activity?

For this research question the planned analysis was moderated regression analysis. The predictor variable was food served. The food served was a percentile score based on the percentage of time the mother met the daily recommendations of the five food groups in a 24-hour period. The outcome variable was the child's BMI-for-age percentile. The moderators were the child's screen-time, sleep duration, and physical

activity. The moderators were measured on a continuous scale. The interaction terms were food served X screen time; food served X sleep duration; and food served X physical activity. If the interaction variable was significant, moderation occurred.

**Research question 4c.** Is the relationship between maternal feeding style and the BMI of a preschool-aged child moderated by maternal smoking, breastfeeding during infancy, or maternal BMI at the time of pregnancy?

This research question was analyzed with moderated regression. The predictor variable was maternal feeding style, either healthy or unhealthy. The outcome variable was the BMI-for-age percentile on the BMI growth curve. The first moderator was maternal smoking, which was dichotomized into yes/no for smoking before, during, or after pregnancy. A mother had a yes for smoking if she smoked one to nine cigarettes daily for one month or more before, during, or after pregnancy. A mother was a non-smoker if she smoked for less than one month before, during, or after pregnancy. The second moderator was breastfeeding, also dichotomized into breast-feeder or bottle-feeder. A mother who breastfed the child for one month or more was categorized a breast-feeder. A mother who breastfed the child for less than one month was categorized a bottle-feeder. The third moderator was maternal weight at pregnancy which was yes for overweight or obese or no for normal weight at the time of pregnancy. The interaction terms were maternal feeding style X smoking; feeding style X breastfeeding; and feeding style X mother's weight at time of pregnancy. If the interaction variable was significant, moderation occurred.

**Research questions 4d.** Is the relationship between the maternal behavior of food served and the BMI of a preschool-aged child moderated by maternal smoking, breastfeeding during infancy, or maternal BMI at the time of pregnancy?

This research question was analyzed with moderated regression. The predictor variable was maternal behavior of food served. The food served was a percentile score based on the percentage of time the mother met the daily recommendations of the five food groups in a 24-hour period. The outcome variable was the BMI-for-age percentile on the BMI growth curve. The first moderator was maternal smoking, which was dichotomized into yes/no for smoking before, during, or after pregnancy. A mother had yes for smoking if she smoked one to nine cigarettes daily for one month or more before, during, or after pregnancy. A mother was a non-smoker if she smoked for less than one month before, during, or after pregnancy. The second moderator was breastfeeding, also dichotomized into breast-feeder or bottle-feeder. A mother who breastfed the child for one month or more was categorized a breast-feeder. A mother who breastfed the child for less than one month was categorized a bottle-feeder. The third moderator was maternal weight at pregnancy which will be yes for overweight or obese or no for normal weight at the time of pregnancy. The interaction terms were food served X smoking; food served X breastfeeding; and food served X mother's weight at time of pregnancy. If the interaction variable was significant, moderation occurred.

### Summary

To determine the effects of maternal beliefs and behavior on a child's body weight status a descriptive correlational study was conducted. This minimal risk study had potential to address the identified gaps in the literature. Results from this study may

provide valuable information to primary care providers of preschool-aged children regarding the effect of maternal beliefs and feeding style behaviors on a child's body weight status. Results from this study may lead to the development of interventions to help mothers recognize their influence on a child's body weight status.



## CHAPTER 4

## Results

Chapter four presents the findings from the current study. The results were analyzed from 126 completed returned research packets. The total population possible at Head Start was 504 mothers, of those, 170 (34%) of the mothers expressed interest in the study and received a research packet. From this convenience sample, 130 mothers actually participated by returning completed packets for a return rate of 75%. According to Pilot and Beck (2008) a response rate (number of people participating/number of people sampled) greater than 65% is sufficient. Four of the packets that were returned were missing more than 10% of the data and therefore were eliminated from data analysis, resulting in a final analytic sample of 126. Of the four packets that were eliminated from data analysis, in two of the packets the mothers did not complete the Child and Diet Evaluation Tool (CADET), one mother only completed five questions on the Demographic Data Sheet (DDS), and one mother did not complete the CADET or the child activity survey (CAS). All data was analyzed using the most recent version of SPSS and data was screened prior to data analysis.

**Data Screening****Data Inspection**

All data was screened prior to analysis and inspected for accuracy of entry, distribution, missing data, and univariate outliers. Data was entered into SPSS one survey packet at a time. After each packet was entered, the data entered was double checked for accuracy. If an error was found the incorrect value was removed and the correct value placed into SPSS. Additionally, after all data had been entered frequencies were

calculated for all variables measured by nominal or ordinal scales to inspect for accuracy of data entry and missing data. For variables measured on interval or ratio scales, the mean, standard deviation, minimum, and maximum values were inspected to ensure data was valid. Any value found to be out of range was checked against the original survey and correct values were entered into SPSS.

**Missing data.** Each variable was inspected for missing data using SPSS. Outputs were examined to verify if data was truly missing or had inadvertently been left out during the data entry process. Inadvertent omissions were subsequently added to the data set. If missing data in a survey packet comprised less than 10% of the total data in that packet and appeared to be random, then the packet was retained for analysis. If missing data appeared as more than 10% or in a pattern, then the entire packet was be discarded. In this study there were no patterns of missing data, however four research packets were found to have random patterns of more than 10% missing data and were subsequently not included in the analysis. Overall there was little missing data in this study therefore imputation strategies were not utilized.

**Normality of the Data.** One of the assumptions underlying regression and correlation analysis is normality of the data. There are two components to normality, skewness, and kurtosis. Data is considered symmetrical if the mean is in the center of the distribution. For this study variables were examined for skewness and kurtosis using histograms with normal plot overlays. The frequencies option of SPSS and the options menu was utilized to select skewness and kurtosis values and their standard errors for the variables. Values below -1.96 and values above 1.96 were considered significantly skewed (Munro, 2005). None of the data was significantly skewed. To determine the

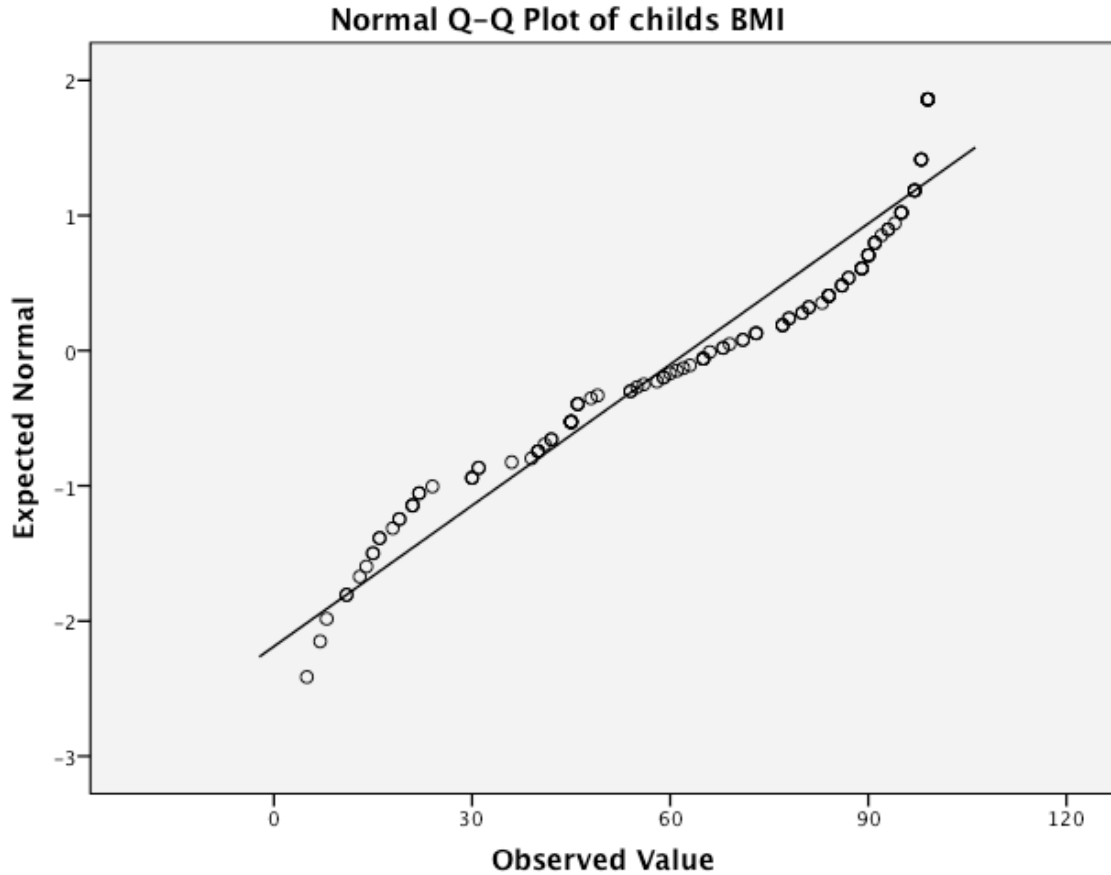
range of kurtosis that was acceptable the standard error of kurtosis was multiplied by two. (Price, 2011). None of the data fell outside of this range. Significant kurtosis was not found in the data. None of the data was log transformed.

### **Screening for Outliers**

An outlier is a value that appears to be extreme when compared to the bulk of the distribution (Munro, 2005). Outliers can lead to type I and type II errors; therefore it is important to identify outliers regardless of the type of variable.

**Continuous variables.** Graphic methods were utilized to identify univariate outliers. For the regression analysis ungroup data was utilized therefore all data was screened together for outliers. A histogram was examined for potential outliers. A case was considered a potential outlier if it was unattached from the rest of the cases. None of the cases were unattached. Additionally, a box plot was evaluated to determine the possibility of potential outliers. The box plot was examined for cases boxed in around the median and for any cases that fell away from the median. Cases did not fall away from the median. The body mass index (BMI) variable was examined because designating children as having a healthy/unhealthy BMI had the potential to result in a U-shaped distribution. However, results revealed none of the children to be unhealthy due to being underweight, and instead a linear distribution was noted, thus log transformation of the BMI variable was not required. Figure 3 is a plot the normal Q-Q plot of child's BMI-for-age percentile.

Figure 3. Plot of Expected and Observed Child's BMI-for-age Percentile



**Dichotomous variables.** For dichotomous variables, outliers are noted when there is an extremely uneven split. According to Tabachnick and Fidell (2007) any dichotomous variable found to have a 90-10 split between categories should be dropped from analysis. For the dichotomous variables of healthy/unhealthy feeding style and healthy/unhealthy weight frequency distributions in SPSS was utilized to evaluate for a 90-10 split of the two variables or  $n = 113$  and  $13$  respectively. For the dichotomous variable healthy/unhealthy feeding style the split was 32 healthy feeding style (authoritative) and 94 unhealthy feeding style (authoritarian, indulgent, uninvolved) for

the Caregiver Feeding Style Questionnaire (CSFQ). Originally, the control over eating feeding style was classified as a healthy feeding style by 10 pediatric experts. However, during the correlation analysis it was found that the control over eating feeding style and the prompting/encouraging feeding style were perfectly inversely correlated. Additionally, the prompting/encouraging feeding style was significantly correlated to the healthy authoritative feeding style. Therefore, the control over eating feeding style was then re-categorized as an unhealthy feeding style. The split for the healthy/unhealthy feeding styles on the Parental Feeding Style Questionnaire (PFSQ) was 50 healthy (prompting/encouraging) and 76 unhealthy (control over eating). For the dichotomous variable of healthy/unhealthy weight, the split was 97 healthy and 39 unhealthy. Because the 90-10 split was not achieved neither variable was dropped from analysis.

**Multicollinearity.** According to Tabachnick and Fidell (2007), multicollinearity exists when two variables are highly correlated at greater than 0.90. Variables collected in research often provided similar information and when the information is similar variables are highly correlated. This high correlation can make evaluation of the results problematic for the researcher does not want to include redundant variables. Redundant variables can inflate the size of the error term and weaken the analysis (Tabachnick & Fidell, 2007). In this study the tolerance of variables were evaluated to determine multicollinearity. The tolerance of a variable is the “proportion of the variability of variable that is not accounted for by the other independent variables” (Munro, 2005, p. 288). The prompting/encouraging feeding style was perfectly inversely correlated with the control over eating feeding style. When regression analysis was run with feeding styles as the predictor variable, the prompting/encouraging feeding style was found to

have a tolerance of less than 0.05 and was subsequently discarded. The prompting/encouraging feeding style was analyzed separately from the other feeding styles. None of the other variables had a tolerance less than or equal to 0.05.

***Singularity.*** Singularity refers to a redundancy in variables, where one of the variables represents a combination of two or more of the other variables. SPSS for the Social Sciences was used to screen for these issues, which screens for the squared multiple correlation of a variable. The squared multiple correlations were screened for a value of one. None of the squared multiple correlations were one. Additionally when the analyses were run SPSS did not issue a warning for singularity.

### **Description of Sample**

#### **Subject Characteristics**

Study participants were recruited from a southeastern Michigan Head Start program. A total of 126 low-income mother/child dyads participated in the study. Of the children 56% ( $n = 71$ ) were female and 43% ( $n = 55$ ) were male. All the mother/child dyads live at or below the level of poverty as required for the child to be eligible for Head Start. The mother in the study was defined as either the biological or adoptive mother or female legal guardian. The child in the study was the youngest child enrolled in the Head Start program. Mother/child dyads included children aged three to five. The children were enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and the mothers were eligible for food stamps. Mothers were eligible for food stamps if their yearly income is at 100% (\$23,050 yearly income for a family of four) of the poverty level. All participants could read and speak English.

### Maternal Characteristics

Frequency distributions were used to evaluate maternal characteristics. The ages of the mothers who participated in the study ranged from 20 to 45 with an average age of 31 ( $M = 30.91$ ,  $SD = 6.57$ ). Table 1 describes the frequency of the mother's ages.

Table 1

#### *Ages of Maternal Participants*

<b>Maternal Age</b>	<b>Number</b>	<b>Percent</b>
20 to 25	32	26%
26 to 30	29	23%
31-35	30	24%
36-40	15	12%
41-45	15	12%

Mothers' level of education ranged from sixth grade to a college degree with the average being a high school graduate or an obtained general education degree ( $M = 12.32$ ,  $SD = 1.78$ ). The educational level of the mother participants is summarized below in Table 2.

Table 2

*Maternal Level of Education*

<b>Level of Education</b>	<b>Number</b>	<b>Percent</b>
6 <sup>th</sup> Grade	1	1%
8 <sup>th</sup> Grade	2	2%
9 <sup>th</sup> Grade	2	2%
10 <sup>th</sup> Grade	8	7%
11 <sup>th</sup> Grade	14	11%
12 <sup>th</sup> Grade or GED	48	42%
1 year of college	16	14%
2 years of college	13	12%
3 years of college	5	4%
4 years of college	4	3%
Completed college	3	2%

The majority of the participants were Black (65%,  $n = 82$ ) followed by White (22%,  $n = 28$ ). Eighty mothers (64%) categorized their ethnicity as Non-Hispanic Black, followed by Non-Hispanic White 22% ( $n = 26$ ). Of the participants 95% ( $n = 119$ ) were mothers and 5% were legal guardians ( $n = 7$ ). The mothers Body Mass Index (BMI) at the time of pregnancy ranged from 14 to 58 with an average of 27 ( $M = 27.3$ ,  $SD = 7.4$ ). The mothers self-reported their height and weight at the time of pregnancy. BMI was then calculated using the CDC BMI calculator for adults. Maternal characteristics are summarized in Table 3.



Table 3

*Descriptive Statistics-Maternal Characteristics*

<b>Maternal Characteristic</b>	<b>Number</b>	<b>Percent</b>
<b>Maternal Race</b>		
Black	82	65%
White	28	22%
Hispanic	7	9%
Asian/Pacific Islander	1	1%
American Indian	1	1%
Other	5	3%
<b>Maternal Ethnicity</b>		
Non-Hispanic Black	80	64%
Non-Hispanic White	26	22%
Hispanic	10	7%
Asian/Pacific Islander	1	1%
Other	7	6%

Table 3 continued

*Descriptive Statistics-Maternal Characteristics*

<b>Mothers Weight Category at the Time of Pregnancy</b>	<b>Number</b>	<b>Percent</b>
Underweight-BMI < 18.5	4	3%
Normal Weight-BMI 18.5 –24.9	54	43%
Overweight- BMI 25 -29.9	31	26%
Obese - BMI $\geq$ 30	34	27%

**Child Characteristics**

The children in the study ranged in age from 37 to 71 months ( $M = 52.14$ ,  $SD = 7.59$ ). The children's ages are summarized below in Table 4.

Table 4

*Summary of Children's Ages*

<b>Child's Age in Months</b>	<b>Number</b>	<b>Percent</b>
37 to 47 months	36	29%
48 to 59 months	54	42%
60 to 71 months	36	29%

Of the children enrolled in the study 65% ( $n = 82$ ) were Black, 13% ( $n = 16$ ) were White, 6% ( $n = 8$ ) were Hispanic, and 16% ( $n = 20$ ) were classified as other. The children's BMI-for-age percentile ranged from 5% to 99% ( $M = 62.95$ ,  $SD = 28.76$ ). A total of 41 children (33%) had a BMI percentile that classified them as having an unhealthy body

weight status (overweight or obese). The results of the frequency analysis of the child's BMI are summarized in Table 5.

Table 5

*Summary of Children's Current BMI*

<b>Weight Category (BMI-for age)</b>	<b>Number</b>	<b>Percent</b>
Underweight < 5 <sup>th</sup> Percentile	0	0
Healthy Weight 5 <sup>th</sup> - 84 <sup>th</sup> Percentile	85	67%
Overweight 85 <sup>th</sup> - 94 <sup>th</sup> Percentile	19	15%
Obese $\geq$ 95 <sup>th</sup> Percentile	22	18%

## **Instruments**

### **Demographic Data Sheet**

As described in Chapter 3, a demographic data sheet was utilized in this study to measure maternal conditioning factors including demographic factors, health factors, household factors, and resource factors, as well as pregnancy and infancy factors. The maternal demographic factors included level of education, race, age, and ethnicity as described above. To evaluate health factors mothers were asked if they currently had a diagnosis of type II diabetes. Type II diabetes was assessed as obesity is the most frequent cause of type II diabetes (CDC, 2011). Of the 126 mothers who participated 93% ( $n = 117$ ) did not have type II diabetes while 7% ( $n = 8$ ) did. Household factors were measured by asking if the mothers had heard of the "My Food Plate" nutritional tool and if they were using it. Of the 126 participants 71% ( $n = 89$ ) had not heard of "My

Food Plate.” However, of those who had heard of the tool only 24% ( $n = 30$ ) were using the “My Food Plate” tool.

In addition to knowledge of the “My Food Plate” tool, maternal household factors included other people living in the house in addition to the mother/child dyad. The total number of people living in the households ranged from 2 to 9 ( $M = 4.26$ ,  $SD = 1.62$ ). In 71% ( $n = 89$ ) of the households the father did not live with the mother/child dyad, while 24% of the mothers’ ( $n = 30$ ) significant others resided in the household. In 16% of the households ( $n = 20$ ) grandparents resided with the mother/child dyad. The majority of the households (73%,  $n = 92$ ) had other children residing in the household ranging from one to seven children ( $M = 1.88$ ,  $SD = 1.57$ ). The birth order of the children participating in the study ranged from first-born to sixth-born with 40% ( $n = 51$ ) being first-born. Children who did not live with their fathers ( $n = 89$ ) spent between zero and seven days per week with the father, with 43% ( $n = 55$ ) having no contact with their fathers at all. Of the children whose father did not reside in the household only 14% child participants ( $n = 13$ ) spent time with their father on a daily basis. Table 6 summarizes the frequency analysis of the household factors.

Table 6

*Summary of Household Factors*

<b>Factor</b>	<b>Number</b>	<b>Percent</b>
<b>Number of People in House</b>		
Two	15	12%
Three	29	23%
Four	30	24%
Five	25	20%
Six	14	11%
Seven to Nine	11	9%
<b>Father Resides in House</b>		
Yes	36	29%
No	89	71%
<b>Mother's Significant</b>		
<b>Other in House</b>		
Yes	30	24%
No	95	76%
<b>Grandparents in House</b>		
No	105	84%
Yes	20	16%

Table 6 continued

*Summary of Household Factors*

<b>Factor</b>	<b>Number</b>	<b>Percent</b>
<b>Other Children in House</b>		
None	24	19%
One or Two	59	47%
Three or Four	35	29%
Five to seven	7	5%
<b>Other Family/Friends</b>		
Yes	14	12%
No	110	88%

Table 6 continued

*Summary of Household Factors*

<b>Factor</b>	<b>Number</b>	<b>Percent</b>
<b>Birth Order of Child</b>		
First Born	50	39%
Second Born	47	37%
Third Born	16	13%
Fourth Born	9	7%
Fifth Born	2	2%
Sixth Born	2	2%
<b>Time Spent with Father in Days per Week if Father did not Reside in Home</b>		
None	55	62%
One	11	12%
Two	4	4%
Three	3	3%
Four	0	0
Five	3	3%
Six	0	0
Seven	13	15%

Table 6 continued

*Summary of Household Factors*

<b>*Source of Transportation</b>	<b>Number</b>	<b>Percent</b>
Own a Car	109	86%
Borrow a Car	12	10%
Bus System	9	7%
Rely on Family and Friends	22	18%
Other	4	3%

\* Mother were asked to check all that apply

Along with demographic, health, and household factors, resource factors were measured. These included how close the mother/child dyad lived to a grocery store and to the WIC office, what forms of transportation the dyad had access to, who did the grocery shopping, and who prepared most of the meals in the household. The distance participants lived from the grocery store and the WIC office ranged from one mile to greater than 15 miles. Of all the participants, the majority, 87% ( $n = 109$ ) owned a car. An overwhelming number of the mothers (98%,  $n = 124$ ) shopped at a grocery store that sold fresh fruits and vegetables. Additionally, 91% of mothers ( $n = 114$ ) in the household did the majority of the grocery shopping and 93% ( $n = 117$ ) prepared most of the meals. The frequency analyses of the resource factors are summarized in Table 7.



Table 7

*Summary of Resource Factors*

<b>Factor</b>	<b>Number</b>	<b>Percent</b>
<b>How Far Mother Lives</b>		
<b>from Grocery Store in</b>		
<b>Miles</b>		
< 1	40	32%
1 to 5	52	41%
6 to 10	26	21%
11 to 15	5	4%
> 15	2	2%
<b>Where Mother Does the</b>		
<b>Majority of the Grocery</b>		
<b>Shopping</b>		
Kroger	18	15%
Aldi	11	9%
Meijer	20	17%
Wal-Mart	34	27%
Other	39	32%

Table 7 continued

*Summary of Resource Factors*

<b>How Far Mother Lives from WIC Office in Miles</b>	<b>Number</b>	<b>Percent</b>
< 1	33	26%
1 to 5	60	48%
6 to 10	21	17%
11 to 15	8	6%
> 15	2	2%

Finally, pregnancy and infancy factors were measured in this study. These factors included the mothers' BMI at the time of pregnancy, maternal smoking before, during, or after pregnancy and duration of breastfeeding during infancy. The mothers BMI at the time of pregnancy ranged from 14 to 58 with an average of 27 ( $M = 27.3$ ,  $SD = 7.4$ ). As previously reported in Table 3, of the mothers that participated in the study, 3% were underweight ( $n = 4$ ), 43% were normal weight ( $n = 54$ ), 25% were overweight ( $n = 31$ ), and 27% were obese ( $n = 34$ ) at the time of pregnancy.

Another pregnancy and infancy factor measured in this study was maternal smoking. Mothers who smoked one to nine cigarettes a day for more than a month were classified as a smoker. Of the participants 68% ( $n = 85$ ) were non-smokers. There was no exposure to smoking in 64% ( $n = 81$ ) of the households. Of the mothers who did smoke three months before pregnancy ( $n = 43$ ), smoking ranged from less than one cigarette per day to 20 to 40 cigarettes per day. Of the mothers who smoked during the last three

months of pregnancy ( $n = 15$ ), smoking ranged from less than one cigarette per day to 20 to 40 cigarettes per day. Of the mothers who currently smoked ( $n = 37$ ) the number of cigarettes per day ranged from less than one to 11 to 20 cigarettes per day.

The last pregnancy and infancy factor measured was duration of breastfeeding during infancy. Mothers were classified as “breast-feeders” if they breast-fed for more than the infant’s first month of life. While 37% of mothers ( $n = 47$ ) reported having breastfed their infant initially at birth, only 29% ( $n = 37$ ) continued for more than the infant’s first month of life. Table 8 summarizes the frequency analyses of the maternal and infancy factors.

Table 8

*Summary of Maternal and Infancy Factors*

<b>Factor</b>	<b>Number</b>	<b>Percent</b>
<b>Smoking Cigarettes Three</b>		
<b>Months Before</b>		
<b>Pregnancy/day</b>		
I did not smoke then	83	65%
< 1 cigarette	2	2%
1 to 5 cigarettes	16	13%
6 to 10 cigarettes	13	10%
11 to 20 cigarettes	9	7%
21 to 40 cigarettes	2	2%
> 40 cigarettes	1	1%

Table 8 continued

*Summary of Maternal and Infancy Factors*

<b>Smoking Cigarettes</b>	<b>Number</b>	<b>Percent</b>
<b>During the Last Three Months of Pregnancy/day</b>		
I did not smoke then	108	85%
< 1 cigarette	3	2%
1 to 5 cigarettes	10	8%
6 to 10 cigarettes	2	2%
<b>Smoking Cigarettes After Pregnancy/day</b>		
I do no smoke	89	71%
< 1 cigarette	2	2%
1 to 5 cigarettes	10	8%
6 to 10 cigarettes	17	13%
11 to 20 cigarettes	8	6%
21 to 40 cigarettes	0	0
41 cigarettes or more	0	0%

**Maternal Beliefs**

*Maternal beliefs survey.* Maternal beliefs were measured using one instrument, the investigator created Maternal Beliefs Survey. Through this survey mothers' beliefs

about the required number of food serving needed per day for their child, mothers' perceptions of their child's weight, mothers perception of the child's eating style, and maternal concern about their child's weight were measured.

**Maternal nutritional belief.** Results showed that the number of servings mothers believed children needed per day of fruits, vegetables, protein, whole grains, and dairy ranged from one to five. While the survey choices ranged from one to five, many mothers wrote in zero in response to sweetened drinks, fats, juices, and sweets. The number of sweetened drinks and fats mothers reported their children needed each day ranged from zero to four per day, while juice and sweets ranged from zero to four per day. The maternal nutritional belief score measured how many servings mothers believed the child needs of protein, milk and dairy, whole grains, fruits, and vegetables per day as compared to the USDA recommendations. A mother was given one point for each correct response to the number of servings the child needs per day for the whole grains, milk and dairy, fruit, vegetable, and protein group. If there was a range to the recommended serving mothers were given a point a if they know the minimum or maximum number of servings per day. Dividing the total points for the correct responses by five determined a percentage score for mother's nutritional belief. In order to get 100% the mother had to know the correct number of serving the child needed from the protein, fruits, vegetable, milk and dairy, and whole grains food group. The maternal nutritional belief score ranged from 20% to 100% ( $M = 74.5$ ,  $SD = 17.86$ ). Table 9 summarizes mothers' nutritional beliefs.

Table 9

*Summary of Maternal Nutritional Beliefs*

Food Group	Recommended Servings	Mean	SD
Fruits	2	2.92	0.85
Vegetables	2	2.92	9.3
Protein	3	2.66	0.82
Whole Grains	3 - 4	2.82	0.86
Milk/Dairy	2 - 3	2.9	1.06
Sweetened Drinks	0	1.2	0.85
Fats	1	1.53	0.82
Juice	1	1.95	0.95
Sweets	> 3 per week	1.25	0.84

**Maternal perception of child's weight.** The majority of mothers 75% ( $n = 95$ ) believed that their child was just the right weight. Of the remaining mothers 3% ( $n = 4$ ) believed their child was underweight, 15% ( $n = 19$ ) believed their child was slightly underweight, and only 6% ( $n = 8$ ) believed their child was overweight. Fifty-two mothers (41%) could not correctly identify their child's weight status. In addition, 7% ( $n = 8$ ) agreed and 1% ( $n = 1$ ) strongly agreed that they were currently concerned about their child's weight. Five mothers, (4%) were concerned their child was underweight, 18% ( $n = 23$ ) were concerned their child was slightly underweight, 3% ( $n = 4$ ) were concerned

their child was overweight, and just 2% ( $n = 2$ ) were concerned their child was very overweight. Of the remaining mothers 40% ( $n=50$ ) strongly disagreed, 33% ( $n = 41$ ) disagreed, and 18% ( $n = 22$ ) neither agreed nor disagreed that they were currently concerned about their child's weight. Table 10 summarizes the mother's perceptions of the child's weight and the children's actual weight categories.

Table 10

*Summary of Mother's Perception and Children's Actual Weight*

<b>Child's Weight Category (BMI-for-Age)</b>	<b>Percent of Childs' Actual Categories</b>	<b>Percent of Maternal Perception of Child's Weight</b>
Underweight < 5 <sup>th</sup> Percentile	0	18%
Healthy Weight > 5 <sup>th</sup> - 84 <sup>th</sup> Percentile	67%	75%
Overweight > 85 <sup>th</sup> - < 94 <sup>th</sup> Percentile	15%	7%
Obese $\geq$ 95 <sup>th</sup> Percentile	18%	0

**Maternal perception of child's eating style.** Continuing with maternal beliefs, this study also measured what type of eater mothers believed their child was. Of the mothers who participated 22% ( $n = 28$ ) believed their child was a very picky eater, 20% ( $n = 26$ ) believed their child was a picky eater, 17% ( $n = 22$ ) believed their child's eating style was neither a picky or good eater, 21% ( $n = 26$ ) believed their child was a good eater, and 19% ( $n = 24$ ) believed their child was a very good eater.

## Maternal Behaviors

Maternal behaviors were measured using three instruments. Two measured the behavior of maternal feeding style, the Parental Feeding Style Questionnaire (PFSQ) (Carnell & Wardle, 2007), and the Caregiver Feeding Style Questionnaire (CFSQ) (Hughes et al., 2005). The third instrument, the Child and Diet Activity Tool (CADET) (Cade, 2005) measured the maternal behavior of food served to the child.

**Parental feeding style questionnaire.** The PSFQ was scored according to the developer's scoring methodology. The PFSQ contains 27 questions measuring the mothers' overall feeding style with four different scales including control over eating feeding style, prompting/encouraging feeding style, instrumental feeding style, and emotional feeding style. A mean score for each scale was calculated to determine the mother's dominant feeding style. The highest mean score from the four scales corresponds to the dominant feeding style for each mother. All of the mother participants demonstrated one of two dominant feeding styles; either the healthy prompting/encouraging (40%,  $n = 50$ ) or the unhealthy control over eating style (60%,  $n = 76$ ). However, the prompting/encouraging feeding style was perfectly inversely correlated with control over eating and therefore, was dropped from the multiple regression analysis for tolerance, and was analyzed separately. None of the mothers in this study demonstrated an emotional or instrumental feeding style as a dominant feeding style. Table 11 summarizes the PSFQ.



Table 11

*Summary of the PSFQ*

Feeding Style	Mean	SD	Range		Cronbach's alpha
			Potential	Actual	
<b>Healthy</b>					
Prompting/Encouraging	3.76	.71	1.00 - 5.00	1.00 - 5.00	.82
<b>Unhealthy</b>					
Control over eating	3.94	.56	1.00 – 5.00	2.50 - 4.90	.75
Instrumental	1.63	.66	1.00 – 5.00	1.00 – 5.00	.70
Emotional	1.49	.62	1.00 – 5.00	1.0 – 3.80	.82

**Caregiver feeding style questionnaire.** The CFSQ was scored according to the developer's methodology. Based on the methodology a mean score is calculated for each participant for the demandingness and the responsiveness scales. Then using the sample's median for each scale the mothers were classified as either high or low demandingness ( $Mdn = 2.63$ ) and high or low responsiveness ( $Mdn = 1.21$ ). Then using the demandingness/ responsiveness matrix mothers were classified into one of four feeding styles from the CSFQ (Table 12). Of the four feeding styles, the authoritative is the only one classified as a healthy feeding style. Only 25% ( $n = 32$ ) of the mothers were classified as using a healthy feeding style on the CSFQ as compared to 40% ( $n = 50$ ) of the mothers who were classified as using a healthy style based on the PSFQ. Table 12 summarizes the results of the CSFQ.

Table 12

*Summary of the CSFQ*

Feeding Style	Demandingness	Responsiveness	n	Percent	Cronbach's Alpha
<b>Healthy</b>					
Authoritative	High	High	32	25%	
<b>Unhealthy</b>					
Authoritarian	High	Low	32	25%	
Indulgent	Low	High	35	29%	
Uninvolved	Low	Low	27	21%	
<b>Scales</b>					
Demandingness					.83
Responsiveness					.67

**CADET.** The last maternal behavior that was evaluated was food served. This behavior was measured using the CADET instrument. The CADET was used as a frequency questionnaire for the number of times a mother served her child a food from specified food groups in a 24-hour period. The served score for the sample ranged from 0% to 80% ( $M = 33.97$ ,  $SD = 21.05$ ). The serve score was calculated from the raw data on the CADET. The food served score was calculated such that if the frequency of the food being offered was equal to the USDA daily frequency recommendations for the food group the mother received one point, if the frequency was above or below the recommendation the mother was given a zero. This was done for all five food groups.

The points from each food group were then totaled. The total points for all five food groups were then divided by five to obtain a percentage. The food served percentage only represents the percentage of time the mother presented the child with a food from the food groups in the correct frequency.

None of the mothers met the USDA daily frequency recommendations for all five groups. Less than half of the mothers met the daily frequency recommendations for fruits (23%), grains (30%), dairy (32%), vegetables (38%), and protein (42%). However, there were some mothers who offered more than the recommended frequency of fruits and proteins. Forty seven percent of mothers ( $n = 59$ ) offered a food from the fruit group at a frequency that was greater than the daily frequency recommendation, and 30% of mothers ( $n = 38$ ) offered a food from the protein group in a frequency that also was greater than the recommended frequency per day.

In addition to the food served, on the CADET mothers were asked specific question about what the child eats on an average day. On an average day 2% milk was consumed by 83% of the children ( $n = 104$ ) in the sample. The most frequently consumed bread type in the sample was whole grain, with 80% ( $n = 100$ ) reporting they ate whole grain bread. Of the spreads, butter-type spread was most frequently consumed (37%,  $n = 28$ ). The number of servings of fruit juice per day on an average day ranged from zero to more than one cup, with 36% ( $n = 45$ ) reporting more than one cup per day. The number of fruit servings per day on an average day ranged from  $\frac{1}{4}$  of a piece of fruit to six servings, with 33% of children ( $n = 42$ ) having two fruit servings per day. Fifty-seven percent of the children ate an entire piece of fruit when served whole fruit. The number of vegetable servings per day ranged from zero to four with most children 36% ( $n = 45$ )

having  $\frac{1}{2}$  a serving of vegetables per day. Lastly, the servings of added sugar in teaspoons per day ranged from zero to seven teaspoons, with most children having no added sugar 40% ( $n = 50$ ). The Cronbach's alpha for the CADET in this study was .63. Table 13 summarizes the frequency food served as recorded on the CADET. Table 14 is a summary of the questions the mothers answered about the child's diet on a typical day.

Table 13

*Summary of the Frequency of Food Served based on the CADET*

<b>Type of Food</b>	<b>Mean</b>	<b>SD</b>	<b>Minimum</b>	<b>Maximum</b>
Cereal	1.04	.77	0	4
Sandwiches, breads	1.72	1.20	0	7
Spreads, sauces	.85	1.20	0	5
Cheese, eggs	1.11	.95	0	4
Chicken, turkey	1.15	.78	0	4
Other meats	1.12	.98	0	4
Fish	.46	.78	0	4
Vegetarian	.53	1.00	0	5
Pizza, pasta rice	1.0	.90	0	4
Desserts, pudding	1.16	1.06	0	5
Sweets, crisp	.86	1.30	0	11
Vegetables and beans	1.50	1.07	0	6
Potato	1.15	1.18	0	6
Fruit	2.42	1.48	0	7
Drinks*	3.47	2.08	0	8

\* Mothers marked M if the drink served was milk

Table 14

*Summary of Additional Information from CADET*

<b>Question</b>	<b>Number</b>	<b>Percent</b>
<b>How Much Milk Per Day</b>		
None	1	1%
¼ cup	13	10%
½ cup	3	3%
¾ cup	40	31%
One cup or more	69	55%
<b>Type of Milk Consumed *</b>		
Whole Milk	29	23%
2% Milk	104	83%
1% Milk	6	5%
Skim Milk	10	8%
Lactose Free	1	1%
Other	6	5%
<b>Type of Bread Consumed*</b>		
White	50	40%
White with added fiber	9	7%
Whole grain	100	80%
Other	13	10%

\* Mothers were asked to check all that apply

Table 14 continued

*Summary of Additional Information from CADET*

<b>Type of Spread*</b>	<b>Number</b>	<b>Percent</b>
Butter	22	18%
Butter type spread	46	37%
Soft Margarine	36	29%
Olive Spread	5	4%
Olive Gold	3	2%
Low-Fat Spread	2	2%
Olive Gold Light	0	0%
Does not have spread	25	20%
<b>Servings of Fruit Juice</b>		
None	6	5%
¼ cup	8	6%
½ cup	14	11%
¾ cup	9	7%
One cup	44	35%
More than one cup	45	36%

\* Mothers were asked to check all that apply

Table 14 continued

*Summary of Additional Information from CADET*

Question	Number	Percent
<b>Servings of Fruit</b>		
<i>(n =125 for this question)</i>		
¼	1	1%
½	5	4%
One	12	10%
Two	42	33%
Three	39	31%
Four	19	15%
Five	5	4%
Six	2	2%
<b>Servings of Vegetables</b>		
<i>(n =125 for this questions)</i>		
None	4	3%
¼	16	13%
½	45	36%
One	42	33%
Two	15	12%
Three	2	2%
Four	1	1%



Table 14 continued

*Summary of Additional Information from CADET*

Question	Number	Percent
<b>How much of a piece of whole fruit the child eats</b>		
A bite	2	2%
¼	8	6%
½	20	16%
¾	23	19%
Whole thing	72	57%
<b>How much added sugar a day</b>		
None	51	40%
1-2 tsp.	36	28%
3-4 tsp.	31	25%
5-6 tsp.	7	6%
7 or more	1	1%

**Child's Health**

**Weight/BMI-for-age percentile.** In order to determine actual weight status, the BMI for each child was calculated based on the child's height and weight as recorded in the child's Head Start file. Head Start follows the CDC guidelines for obtaining a child's height and weight. After the BMI was calculated it was compared to the perceived weight

status reported by mothers to determine correct or incorrect perception. The children's BMI-for-age percentile ranged from the 5<sup>th</sup> to 99<sup>th</sup> percentile ( $M = 62.95$ ,  $SD = 28.76$ ). The majority of children's BMI-for-age percentiles (69%,  $n = 87$ ) fell within a healthy range. The remainder of the children (31%,  $n = 37$ ) exhibited BMI-for-age percentiles outside of the healthy range ( $> 84^{\text{th}}$  percentile), either being overweight or obese. None of the children were underweight.

Table 15

*Children's Body Weight Status*

<b>Body Weight Status</b>	<b>Number</b>	<b>Percent</b>
Healthy Weight	87	69%
Overweight	17	13%
Obese	22	18%

**Activity Level.** Another indicator of health status in children is their overall activity level. In this study children's activity was evaluated using the investigator created Child Activity Survey. This instrument contains 10 questions about the child's physical activity, screen time, sleep patterns, and physical activity.

*Physical activity.* To assess the child's physical activity level, mothers were asked how many days a week their child participated in physical exercise or play for 60 minutes or greater per day. Examples of physical activity or play for a preschool-aged child are activities such as running, biking, climbing, or active playing such as tag. Five percent ( $n = 6$ ) of the mothers reported their child participated in 60 minutes or more of physical activity one to two days or less, 47% ( $n = 58$ ) reported the child was physically active

three to five days per week, and 48% ( $n = 61$ ) reported the child was physically active six to seven days per week.

*Screen time.* The American Academy of Pediatrics recommends less than two hours of total screen time per day for children (AAP, 2011). In this sample 80% ( $n = 101$ ) of the children had greater than two hours a day of total screen time. Television time ranged from zero to 330 minutes per day ( $M = 130.72$ ,  $SD = 68.43$ ). Video game time ranged from zero to 240 minutes per day ( $M = 28.75$ ,  $SD = 52.03$ ). Total computer time for the sample ranged from zero to 210 minutes ( $M = 21.90$ ,  $SD = 39.51$ ). The total time spent on an iPod or Nintendo ranged from zero to 300 minutes per day ( $M = 25.48$ ,  $SD = 45.11$ ). Lastly, the total time on a cell phone playing games or watching videos ranged from zero to 180 minutes per day ( $M = 15.86$ ,  $SD = 31.15$ ). The total of all screen time activities ranged from 30 to 660 minutes per day ( $M = 222.26$ ,  $SD = 140.68$ ,  $Mdn = 180.00$ ).

*Sleep.* In addition to screen time, the child activity survey evaluated typical sleep patterns. In the sample, hours of sleep at night ranged from six to 13 hours per night ( $M = 9.17$ ,  $SD = 1.48$ ). Of the children in the sample the majority (72%,  $n = 91$ ) took a nap at least one day a week. The number of days per week children took a nap ranged from one to seven days ( $M = 4.44$ ,  $SD = 2.18$ ) with the length of the naps ranging from 30 minutes to four hours ( $M = 102.98$ ,  $SD = 41.78$ ). Table 16 shows a summary of the child's activities.

Table 16

*Summary of Child's Activities*

<b>Activity</b>	<b>Number</b>	<b>Percent</b>
<b>Hours of Sleep per Night</b>		
Six hours	3	2%
Seven hours	1	1%
Eight hours	34	29%
Nine hours	28	24%
Ten hours	37	31%
Eleven hours	11	9%
Twelve hours	3	3%
Thirteen hours	1	1 %

Table 16 continued

*Summary of Child's Activities*

<b>Activity</b>	<b>Number</b>	<b>Percent</b>
<b>Naps During the Week</b>		
Yes	91	72%
No	35	28%
<b>Number Naps/per Week</b>		
One	9	7%
Two	10	11%
Three	16	17%
Four	12	13%
Five	15	15%
Six	6	6%
Seven	28	31%
<b>Total Screen Time</b>		
<b>&gt; 2 hours per day</b>		
No	25	20%
Yes	101	80%

### Correlation Matrix of Major Study Variables

Figure 4. Correlation Matrix of Major Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<sup>1</sup> Perception of Child's Weight															
<sup>2</sup> Currently Concerned															
<sup>3</sup> Knowledge Score															
<sup>4</sup> Authoritative															
<sup>5</sup> Authoritarian															
<sup>6</sup> Indulgent															
<sup>7</sup> Prompting															
<sup>8</sup> Control over eating															
<sup>9</sup> BMI @ Pregnancy															
<sup>10</sup> Breastfeed > 1 month															
<sup>11</sup> Smoker/nonsmoker															
<sup>12</sup> Sleep @ Night															
<sup>13</sup> > 60 minutes PA Daily															
<sup>14</sup> Total Screen Time > 2 hours															
<sup>15</sup> Child's BMI															

\*\* Correlation Significant at the 0.01 Level

\* Correlation Significant at the 0.05 Level

The above figure is the correlation matrix of the major study variables from the study. There were a number of significant, but relatively weak correlations among the major study variables.

### Maternal Beliefs Correlation

In the study there were significant correlations with maternal beliefs. The maternal nutritional belief score was significantly correlated to physical activity ( $r = .19$ ,  $p = .02$ ) and to the authoritative feeding style ( $r = .20$ ,  $p = .02$ ). The maternal belief of mother's perception of child's weight was significantly correlated to the mother's BMI at the time of pregnancy ( $r = .28$ ,  $p = .002$ ) and the child's current BMI-for-age percentile, ( $r = .27$ ,  $p = .002$ ).

### Maternal Behavior Correlations

In the current study feeding styles from two different questionnaires were included in the analyses. From the CFSQ the maternal feeding styles of authoritative, authoritarian, and indulgent and from the PFSQ control over eating and prompting/encouraging were analyzed. The two healthy feeding styles, authoritative and prompting/encouraging had a weak, but significant correlation with each other ( $r = .17$ ,  $p = .04$ ). The authoritative feeding style was significantly inversely correlated with three unhealthy feeding styles: control over eating ( $r = -.17$ ,  $p = .04$ ), authoritarian ( $r = -.34$ ,  $p = < .001$ ), and the indulgent feeding style ( $r = -.36$ ,  $p = < .001$ ). Two unhealthy feeding styles, authoritarian and indulgent, were significantly inversely correlated with each other ( $r = -.36$ ,  $p = < .001$ ). This finding is not unexpected as these reflect opposing styles of feeding, but both of which are unhealthy. Similarly, the prompting/encouraging feeding style was significantly inversely correlated with the unhealthy control over eating feeding style ( $r = -1.00$ ,  $p < .001$ ). As these two variables were perfectly correlated the feeding style of prompting/encouraging was analyzed separately from the other feeding style variables.

There were significant correlations between the maternal behavior (feeding style) and the child's health behavior factors. Healthy feeding styles were significantly related to healthy behaviors. The authoritative feeding style was significantly, positively correlated with the hours of sleep a child gets per night ( $r = .23, p = .01$ ) and the prompting/encouraging feeding style was significantly correlated to weekly physical activity ( $r = .18, p = .04$ ). The inverse was also true as unhealthy feeding styles were associated with unhealthy child behaviors. The authoritarian feeding style was significantly inversely correlated to sleep at night ( $r = -.22, p = .01$ ), and control over eating was inversely correlated with weekly physical activity ( $r = -.27, p = .002$ ).

In addition, there was a positive, significant correlation between breastfeeding the child for greater than one month and the use of the healthy prompting/encouraging feeding styles during the preschool years ( $r = .27, p = .002$ )

### **Specific Aims**

One hundred and twenty-six packets were included in data analysis of the specific aims. It was expected that mothers would be classified as having a healthy feeding style or an unhealthy feeding style on both the Caregiver Feeding Style Questionnaire and the Parental Feeding Style Questionnaire. However, this classification did not occur. Some mothers were classified as utilizing a healthy feeding style on one questionnaire and utilizing an unhealthy feeding style on the other questionnaire. Therefore, for all planned analysis that utilized healthy/unhealthy feeding styles as an outcome variable separate analysis were run for each feeding style instrument.



### Specific Aim One

The first specific aim of the study was to determine which maternal beliefs (nutritional belief, perceptions and concerns regarding the child's weight) were most predictive of maternal behavior. Specific aim one had three research questions. These were:

**Research question 1a.** Does maternal level of concern differentially predict healthy/unhealthy maternal feeding styles?

**Research question 1b.** Does a mother's perception of a child's body weight status differentially predict maternal feeding style?

**Research question 1c.** Does maternal nutritional belief differentially predict healthy/unhealthy maternal feeding style?

Specific aim one was analyzed utilizing logistic regression ( $N = 126$ ). The predictor variables were maternal nutritional belief, maternal level of concern and perception of child's body weight status. The outcome variable was healthy/unhealthy feedings styles from the CSFQ. These were the feeding styles of authoritative (healthy), authoritarian (unhealthy), or indulgent (unhealthy). None of the relationships between maternal beliefs and maternal behavior were statistically significant a 0.05 level when analyzed. However, the maternal belief of perception of child's body weight status was approaching a significant relationship with the outcome variable of healthy/unhealthy maternal feeding style from the CFSQ ( $B = .938$ , 95% CI [.981, 6.66]  $p = .055$ ).

The feeding styles from the PSFQ were analyzed separately from the CSFQ as mothers were classified as having a healthy feeding style on the CSFQ and an unhealthy feeding style on the PSFQ. None of the mothers were classified as an emotional feeder or

an instrumental feeder, therefore only two, the prompting/encouraging (healthy) and the control over eating (unhealthy), feeding styles from the PFSQ were used.

In a separate logistic regression analysis the three maternal beliefs were entered into the model as the predictor variables with the outcome variable of the healthy feeding style from the PSFQ of prompting/encouraging. Prompting/encouraging was dichotomized into 0 = not prompting (unhealthy) and 1 = prompting (healthy). To determine if the data was a good fit to the model, the Hosmer and Lemeshow goodness of fit test was utilized. For the Hosmer and Lemeshow goodness of fit, a non-significant chi-square is desired. A non-significant chi-square indicates that the data fits the model well and that the model being tested “adequately duplicates the observed frequencies of the outcome” (Polit and Beck, 2009, p. 450). The Hosmer and Lemeshow goodness of fit in the logistic regression analysis indicated that the data fit the model well ( $\chi^2 = 4.16$ ,  $df = 8$ ,  $p = .84$ ). The prompting/encouraging feeding style was significantly related to maternal nutritional belief. A mother with a higher nutritional belief score was 1.02 (95% CI 1.01, 1.046) times more likely to use the healthy feeding style of prompting/encouraging than mothers with a lower knowledge score ( $p = .04$ ).

In a separate logistic regression analysis, the three maternal beliefs were entered as the predictors with the unhealthy control over eating feeding style for the PSFQ outcome variable. The control over eating (unhealthy) feeding style was dichotomized into 0 =not control over eating (healthy) and 1 = control over eating (unhealthy). The Hosmer and Lemeshow goodness of fit test was utilized in the logistic regression analysis to determine if the data fit the model. The non-significant results of the Hosmer and Lemeshow goodness of fit indicated that the data fit the model well ( $\chi^2 = 9.33$ ,  $df = 8$ ,  $p$

= .31). The control over eating feeding style was significantly inversely correlated to maternal nutritional belief score. A mother with a higher nutritional belief score was .97 (95% CI .95, .99) times less likely to use the unhealthy feeding style of control over eating ( $p = .04$ ) than mothers with a lower nutritional belief score.

In an additional analysis, the child's eating style was the entered as the only predictor in the logistic regression model and the outcome variable was the healthy/unhealthy feeding style from the CFSQ. The Hosmer and Lemeshow goodness of fit was non-significant indicating that the data fit the model well ( $X^2 = 2.63$ ,  $df = 3$ ,  $p = .45$ ). Mothers who believed the child was a good eater were 1.7 times (95% CI 1.24, 2.31) more likely to utilize a healthy authoritative feeding style than mothers who thought their child was a picky eater ( $p = .001$ ) when analyzed using the feeding styles from the CFSQ.

### **Specific Aim Two**

The second specific aim of the study was to determine the extent to which maternal behaviors predicted a child's body weight status. Specific aim two had one hypothesis. The hypothesis analyzed was:

**Hypothesis 2a.** Mothers who utilize a healthy feeding style have children with a BMI within a healthy range.

This hypothesis was tested using analysis of frequency (chi-square test) to determine the likelihood of having a healthy BMI given a healthy feeding style. Again the two feeding style questionnaires were analyzed separately. The variables of BMI and feeding style were dichotomized into healthy/unhealthy weight and healthy/unhealthy feeding styles, respectively. First the analysis was conducted with the feeding styles from

the CFSQ. From the CSFQ the feeding styles utilized in the analysis were authoritative (healthy), authoritarian (unhealthy), or indulgent (unhealthy). The relationship between feeding style and BMI was not statistically significant. However, of the 39 children who were classified as having an unhealthy weight (either overweight or obese), based on the CSFQ, 77% ( $n = 30$ ) of their mothers used an unhealthy feeding style. Seven (18%) of the children had mothers who used the unhealthy authoritarian feeding style, 26% ( $n = 10$ ) of the children had mother who used the unhealthy uninvolved feeding style, and 13 (33%) of the children with unhealthy weights had mothers who used the unhealthy indulgent feeding style.

In the second analysis, the feeding styles of control over eating and prompting/encouraging feeding style from the PSFQ were analyzed. Again, in the second analysis the relationship of feeding style to BMI was not statistically significant. While not statistically significant, it was found that 64% ( $n = 25$ ) of the mothers who had a child with an unhealthy weight (overweight or obese) utilized the unhealthy control over eating feeding style based on the PSFQ.

Specific aim two had two research questions. The first research question was:

**Research question 2a.** Which of the eight different feeding styles are most predictive of a child's body weight status?

This research question was analyzed using backward selection multiple regression to determine the best fitting model. In backward selection all the predictors are included in the model. Subsequently each predictor is eliminated based on the one that contributes the least to the model. The predictor with the largest  $p$ -value is eliminated from the model first. This process continues until the best fitting model is determined. The predictors for

the regression analysis in this study included three maternal feeding styles from the CFSQ (authoritative, authoritarian, and indulgent). Each of these feeding styles was dummy coded for the regression analysis, with the uninvolved feeding style used as a reference category for the CFSQ dummy variables. From the PSFQ only one feeding style was used, control over eating. The control over eating feeding style was coded 0 = not control over eating and 1 = control over eating. The prompting/encouraging feeding style was excluded because it had a perfect inverse correlation with the control over eating feeding style, and a tolerance less than .05. The emotional and instrumental feeding styles were also excluded as none of the mothers in this sample were classified as utilizing either of these styles as their dominant style. Therefore, only four feeding styles were included in this multiple regression analysis (authoritative, authoritarian, indulgent, and control over eating), with the four predictors entered in one block. The outcome variable was the BMI-for-age percentile, which is a continuous variable.

Model one contained the four feeding styles of authoritative, authoritarian, indulgent and control over eating. In the first model, only one predictor had a significant relationship with the child's BMI. There was a significant inverse relationship between the authoritarian feeding style and a child's BMI-for-age percentile ( $\beta = -.23, p = .05$ ). From this model the control over eating was eliminated for the largest  $p$ -value ( $p = .78$ ). In the second model the indulgent feeding style was eliminated for the largest  $p$ -value ( $p = .69$ ), and there were no additional significant relationships noted. In model three the authoritative feeding style was eliminated with the largest  $p$ -value ( $p = .60$ ). There were no additional significant relationships in model three. Model four was determined to be the best fitting model ( $F(1, 124) = 4.64, p = .03$ ) and the only predictor in the model was

the authoritarian feeding style, which was significantly inversely correlated with BMI ( $\beta = -.19, p = .03$ ), and explained 3.6% of the variance in BMI. The more authoritarian the mother was in her feeding style the lower the child's BMI-for-age percentile. Table 17 is a summary of the models of the regression analysis, backward selection.

Table 17

*Regression Analysis- Backward Selection Predictors of Child's BMI-for-age Percentile**(N =126)*

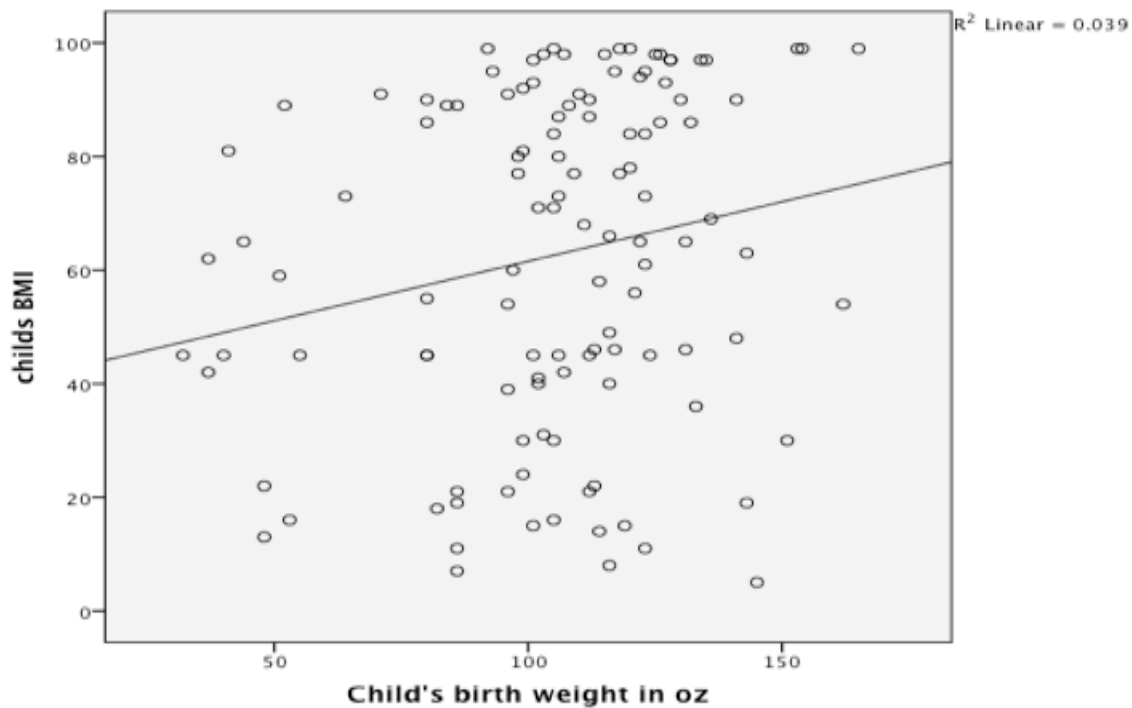
Predictor	<u>BMI-for-Age Percentile</u>				
	Model 1 B	Model 2 B	Model 3 B	Model 4 B	95%CI
Constant	67.79**	68.85**	67.22**	66.128**	60.34 to 71.96
Control over eating	1.49				
Indulgent	- 2.67	-2.88			
Authoritative	- 4.41	- 4.8	- 3.22		
Authoritarian	-15.01*	-15.22*	-13.60*	-12.50*	-23.98 to -1.01
R <sup>2</sup>	.042	.039	.038	.036	

\* $p < .05$ ,  $F(1, 124) = 4.64$ ,  $p = .03$ ,  $R^2 = .036$

The prompting/encouraging feeding style was analyzed separately. A significant relationship between the feeding style and the child's BMI-for-age percentile was not found ( $\beta = -.03, p = .70$ ).

One additional analysis was run to determine if the child's birth weight could predict the preschool-aged child's BMI-for-age percentile. Simple linear regression analysis revealed a significant relationship between the child's birth weight and the child's BMI-for-age percentile ( $\beta = .19, p = .03$ ). Results showed a direct relationship between the child's birth weight and current BMI-for-age percentile however, birth weight only accounted for a small percent of the variance (3.9%). The higher the child's weight at birth, the higher the child's current BMI-for-age percentile during the preschool period. Figure 5 is a plot of the BMI-for-age percentile and the child's birth weight.

Figure 5. Plot of the Relationship Between BMI-for-age Percentiles





The second research question associated with specific aim two was:

**Research question 2b.** What is the relationship between the food served and the child's BMI?

This research question was analyzed using simple linear regression, which is appropriate when the outcome variable is continuous and the predictor variables are either continuous or discrete. For this analysis, the predictor variable was the percentage of time the mother met the daily-recommended frequency of presenting the child with a food from the five food groups in a 24-hour period, and the outcome variable was the child's BMI. This relationship was not statistically significant ( $\beta = -.05$ ,  $p = .56$ ).

An additional logistic regression analysis was conducted related to the food the mothers served. The predictor variables in the model were (a) cereals, (b) sandwiches, breads, and cakes, (c) spreads and sauces (d) cheese and eggs, (e) chicken and turkey, (f) other meats, (g) fish, (h) vegetarian, (I) pizza and pasta rice (j) desserts and pudding (k) sweets and crisps (chips) (l) vegetables and beans, (m) potato, and (n) fruit servings. The outcome variable was a healthy/unhealthy feeding style from the CFSQ. The Hosmer and Lemeshow goodness of fit was evaluated to determine if the data was a good fit with the model. The non-significant Hosmer and Lemeshow results indicate that the data was a good fit with the model ( $X^2 = 5.15$ ,  $df = 8$ ,  $p = .74$ ). There was a significant relationship between the healthy feeding style of authoritative and fruit servings and vegetarian servings. A mother who used an authoritative feeding style was 1.6 (95% CI 1.15, 2.42) times more likely to serve fruit to the child ( $p = .007$ ) than a mother who used an unhealthy feeding style. Additionally, a mother who used an authoritative feeding style

was 0.49 (95% CI .24, .99) times less likely to serve the child vegetarian foods (vegetarian sausages, pasty, vegetable pie) ( $p = .04$ ).

The feeding styles of prompting/encouraging (healthy) and control over eating (unhealthy) were analyzed using logistic regression related to the food the mothers served. The predictor variables were (a) cereals, (b) sandwiches, breads, and cakes, (c) spreads and sauces (d) cheese and eggs, (e) chicken and turkey, (f) other meats, (g) fish, (h) vegetarian, (I) pizza and pasta rice (j) desserts and pudding (k) sweets and crisps (chips) (l) vegetables and beans, (m) potato, and (n) fruit servings. There were no significant relationships between the food a mother served and either the prompting/encouraging or the control over eating feeding styles.

### **Specific Aim Three**

Specific aim three was to determine the combined effect of maternal beliefs and maternal behaviors on a child's body weight status. This aim was analyzed using hierarchical multiple regression. Variables were entered according to the guiding theoretical framework. The outcome variable for the analysis was the child's body weight status, which is the BMI-for-age percentile on the growth curve. In step one the predictor variables were the three maternal beliefs of maternal nutritional belief (continuous variable), maternal concern (likert scale treated as interval), and maternal perception of the child's body weight status (ordinal scale, with perception ranging from believing the child was (a) underweight, (b) slightly underweight (c) just the right weight (d) slightly overweight, to (e) very overweight). In step two the maternal behavior of feeding styles was entered. These included authoritative, authoritarian, and indulgent feeding styles determined from the CFSQ. The uninvolved feeding style was the reference variable for

the dummy coding. The control over eating feeding style was the only style used from the PFSQ as none of the mothers in this study demonstrated an instrumental or emotional feeding style as their dominant feeding style. Additionally, the feeding style of prompting/encouraging was discarded due to a tolerance in the collinearity statistics of less than .05 and prompting/encouraging was perfectly inversely correlated to the control over eating feeding style.

In the first step, the model with the three predictor variables of maternal beliefs was found to be significant ( $F(3, 118) = 3.47, p = .01$ ). However, only one of the three predictors in the model had a significant relationship with the outcome variable of child's BMI. There was a direct significant relationship between maternal perception of the child's body weight status and the child's actual BMI-for-age percentile ( $\beta = .25, p = .004$ ). The first model explained 8.2% of the variance. Step two contained seven predictor variables (beliefs and behaviors), however only one of the predictors was found to be significant. There was a significant relationship between maternal perception of child's body weight status and the child's BMI-for-age percentile in step two ( $\beta = .23, p = .01$ ). However, the second model was not found to be significant ( $F(7, 114) = 1.82, p = .09$ ). There were no significant relationships between the remaining maternal beliefs and maternal behaviors and the child's BMI-for-age percentile. Therefore, model one was determined to be the best fitting model with three predictors ( $F(3, 118) = 3.47, p = .01$ ). However, only the predictor of mother's perception of the child's body weight status was significant ( $\beta = .25, p = .004$ ). The model only explained a small amount of the variance ( $R^2 = .08$ ). If a mother perceived her child as overweight or obese the more likely the

child was to be overweight or obese. The coefficients for the regression analysis are shown Table 18.

Table 18

*Hierarchical Multiple Regression Predictors of Child's BMI-for-Age Percentile (N = 126)*

<b>Child's BMI-for-Age Percentile</b>		
<b>Predictor</b>	$R^2$	$\beta$
<b>Step One</b>	.081	
Constant		
Perception of Child's Weight Currently Concerned about child's Weight Knowledge Score		.25*     .03    .12
<b>Step Two</b>	.019	
Constant		
Perception of Child's Weight Currently Concerned about child's Weight Knowledge Score		.23*     .10
Authoritative		-.05
Authoritarian		-.17
Indulgent		-.06
Controlling		.01
Total $R^2$	.10	

\* $p < .05$ , Step one model,  $F(3, 118) = 3.47$ ,  $p = .01$ ,  $R^2 = .081$

### Specific Aim Four

Specific aim four was to determine the extent to which the relationship between maternal behaviors and the body weight status of a preschool-aged child is moderated by either the child's behavior and/or pregnancy and infancy factors. This analysis included the maternal behaviors of authoritative, authoritarian, indulgent, control over eating and prompting/encouraging feeding styles. The uninvolved feeding style was the reference variable for the dummy coding.

Specific aim four had four research questions. The first research question was:

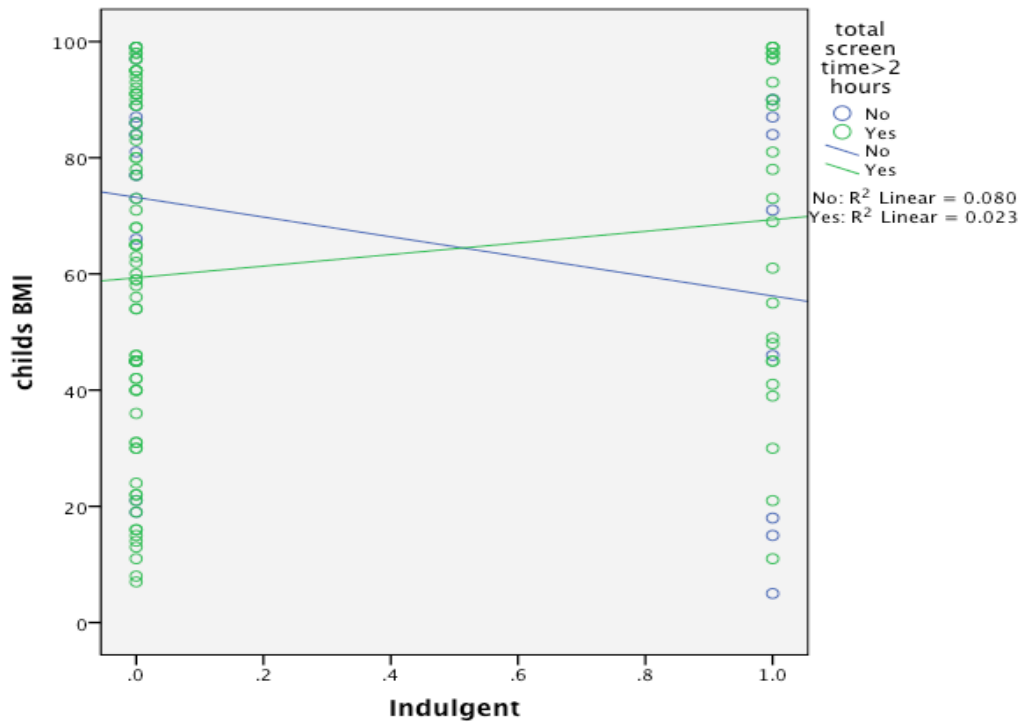
**Research question 4a.** Is the relationship between maternal feeding style and the BMI of a preschool-aged child moderated by the child's screen time, sleep duration, or physical activity?

For this research question moderated regression analysis was employed. The predictor variables were the maternal feeding styles of authoritative, authoritarian, indulgent, control over eating, and prompting/encouraging. Each feeding style was analyzed separately with the moderators. The outcome variable was the child's BMI-for-age percentile. The moderator of sleep time was measured on a continuous scale and screen time and physical activity were nominal. Transforming the variables in SPSS created the interaction terms. The interaction terms of feeding style (authoritative, authoritarian, indulgent, control over eating, prompting/encouraging), X screen time; feeding style (authoritative, authoritarian, indulgent, control over eating and prompting/encouraging), X sleep duration; and feeding style (authoritative, authoritarian, indulgent, control over eating, and prompting/encouraging), and X physical activity were created in SPSS by transforming the variables. In the moderated regression analysis all

child behaviors were grouped to determine which of the variables, if any moderate the relationship between maternal feeding style and the child's BMI.

Results showed that in the group of child activity predictors the only significant interaction was between an indulgent feeding style and greater than two hours of screen time. Screen time was found to moderate the relationship between an indulgent feeding style and the child's BMI. If a mother used the unhealthy indulgent feeding style, there was not a significant relationship with the child's BMI. However, if a mother used the unhealthy indulgent feeding style and was indulgent in screen time, allowing the child more than two hours of screen time a day, the interaction was found to be significant with the child's BMI. Children of these mothers were found to have higher BMI's than the children of mothers who used an indulgent feeding style, but limited the child's screen time to less than two hours per day ( $\beta = .44, p = .03$ ). Figure 6 is a plot of indulgent feeding style and screen time greater than 2 hours per day.

Figure 6. The interaction Between an Indulgent Feeding Style and Screen Time Greater than Two Hours per Day and a Child's BMI-for-Age Percentile



None of the other child activities were found to moderate the relationship between feeding styles and the child's BMI-for-age percentile. Table 19 provides the regression output for the interaction terms with the indulgent feeding style from the CSFQ. Table 20 provides the regression output for the interaction terms with the authoritative feeding style from the CSFQ. Table 21 provides the regression output for the interaction terms with the authoritarian feeding style from the CSFQ. Table 22 provides the regression output for the interaction terms for the control over eating feeding style from the PSFQ. Table 23 provides the regression output for the prompting/encouraging feeding style from the PSFQ.

Table 19

*Moderated Regression Analysis; Effect of Child Activity on Relationship of Indulgent Feeding Style from the CSFQ with BMI-for-age Percentile (N = 126)*

<b>Interaction</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b><math>\beta</math></b>	<b>t</b>	<b>Sig.</b>
	<b>B</b>				
Indulgent X Screen time > 2 hours per day	30.90	14.78	.44	2.09	.03
Indulgent X Sleep at Night	4.36	5.51	.62	.84	.39
Indulgent X Physical Activity	-1.79	10.11	-.06	-.17	.85

$F(7, 109) = .79, p = .59, R^2 = .04$

Table 20

*Moderated Regression Analysis; Effect of Child Activity on Relationship of Authoritative Feeding Style from the CSFQ with BMI-for-age Percentile (N = 126)*

<b>Interaction</b>	<b>Coefficient</b>	<b>Std.</b>	<b><math>\beta</math></b>	<b>t</b>	<b>Sig.</b>
	<b>B</b>	<b>Error</b>			
Authoritative X Screen Time > 2 hours	- 16.47	16.06	-.24	-1.02	.30
Authoritative X Sleep at Night	-16.44	16.06	.01	- 1.02	.30
Authoritative X Physical Activity	10.95	10.59	.44	1.03	.30

$F(7, 109) = .40, p = .89, R^2 = .02$



Table 21

*Moderated Regression Analysis; Effect of Child Activity on Relationship of Authoritarian Feeding Style from the CSFQ with BMI-for-age Percentile (N = 126)*

Interaction	Coefficient	Std. Error	$\beta$	t	Sig.
	B				
Authoritarian X Screen time > 2 hours per day	- 9.06	18.47	-.28	- .49	.62
Authoritarian X Sleep at Night	- 1.95	4.29	-.29	- .45	.65
Authoritarian X Physical Activity	- 2.84	12.71	-.24	- .11	.82

$F(6, 110) = .57, p = .74, R^2 = .03$

Table 22

*Moderated Regression Analysis; Effect of Child Activity on Relationship of Control over Eating Feeding Style from the PSFQ with BMI-for-age Percentile (N = 126)*

<b>Interaction</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b><math>\beta</math></b>	<b>t</b>	<b>Sig.</b>
	<b>B</b>				
Control over eating X Sleep at night	-1.14	3.12	.18	-.36	.71
Control over eating X Physical activity	-9.18	13.72	.03	-.66	.50
Control over eating X Screen time > 2 hours	- 4.75	13.69	-.08	- .34	.72

$F(6, 110) = .13, p = .99, R^2 = .007$

Table 23

*Moderated Regression Analysis; Effect of Child Activity on Relationship of Prompting/encouraging Feeding Style from the PSFQ with BMI-for-age Percentile (N = 126)*

Interaction	Coefficient	Std. Error	$\beta$	t-statistic	Sig.
<b>B</b>					
Prompting/encouraging X Sleep at night	-1.77	3.87	-.29	-.29	.64
Prompting/encouraging X Physical activity	13.45	9.78	.63	.63	.17
Prompting/Encouraging X Screen time > 2 hours	4.76	13.63	.67	.35	.72
$F(7, 109) = .38, p = .91, R^2 = .02$					

The second research question associated with specific aim four was:

**Research question 4b.** Is the relationship between the maternal behavior of food served and the BMI of a preschool-aged child moderated by the child's screen time, sleep duration, or physical activity?

The analysis completed for this research question was moderated regression analysis with a predictor variable of food served. The outcome variable was the child's BMI-for-age percentile. The moderators were the child's screen time, sleep duration, and physical activity. Transforming the variables in SPSS created the interaction terms. The moderator of food served was measured on continuous scale and the screen time and

physical activity were nominal. The interaction terms were food served X screen time; food served X sleep duration; and food served X physical activity. In the moderated regression analysis all child behaviors were aggregated to determine which of the variables if any, moderated the relationship between maternal feeding style and the child's BMI. Moderation did not occur. None of the interaction terms were found to have a significant relationship with the outcome variable of the child's BMI-for-age percentile, thus there was no moderation by child activity. Table 24 provides the regression analysis for the interaction variable.

Table 24

*Moderated Regression Analysis: Effect of Child Activity on Relationship of Food Served and BMI (N = 126)*

Interaction	Coefficient B	Std. Error	$\beta$	t-statistic	Sig.
Food served X Screen Time	.20	.35	.16	.57	.56
Food served X Sleep Duration	.14	.12	1.03	1.16	.24
Food served X Physical Activity	.16	.22	.30	.75	.45

$F(13, 98) = 1.24, p = .27, R^2 = .14$

The third research question associated with specific aim four was:

**Research question 4c.** Is the relationship between maternal feeding style and the BMI of a preschool-aged child moderated by maternal smoking, breastfeeding during infancy, or maternal BMI at the time of pregnancy?

This research question was analyzed with moderated regression. The predictor variables were authoritative, authoritarian, indulgent, control over eating, and

prompting/encouraging maternal feeding styles. The outcome variable was BMI-for-age percentile on the BMI growth curve. Transforming the original variables in SPSS created the interactions terms. The interaction terms were maternal feeding style (authoritative, indulgent, control over eating, and prompting/encouraging) X smoking; feeding style (authoritative, indulgent, control over eating, and prompting/encouraging) X breastfeeding; and feeding style (authoritative, indulgent, control over eating and prompting/encouraging) X mother's weight at time of pregnancy. In the moderated regression analysis all maternal factors were grouped to determine which of the variables if any, moderated the relationship between maternal feeding style and the child's BMI. Only one interaction variable was statistically significant. Maternal BMI at the time of pregnancy moderated the relationship between the prompting/encouraging feeding style and the child's BMI-for-age percentile. Even if a mother utilizes the healthy feeding style of prompting/encouraging, if the mother was overweight or obese at the time of pregnancy the child had a higher BMI-for-age percentile than children of mothers who were either underweight or normal weight at the time of pregnancy ( $\beta = .93, p = .01$ ). One of the interaction terms in this analysis was approaching significance. There was an inverse relationship between the interaction term of indulgent feeding style and maternal breastfeeding with child's BMI-for-age percentile and it approached significance  $p = .06$ . Figure 7 provides the plot of maternal BMI at the time of pregnancy and child's BMI-for-age percentile.

Figure 7. Maternal BMI at the Time of Pregnancy and Child’s BMI-for-age Percentile

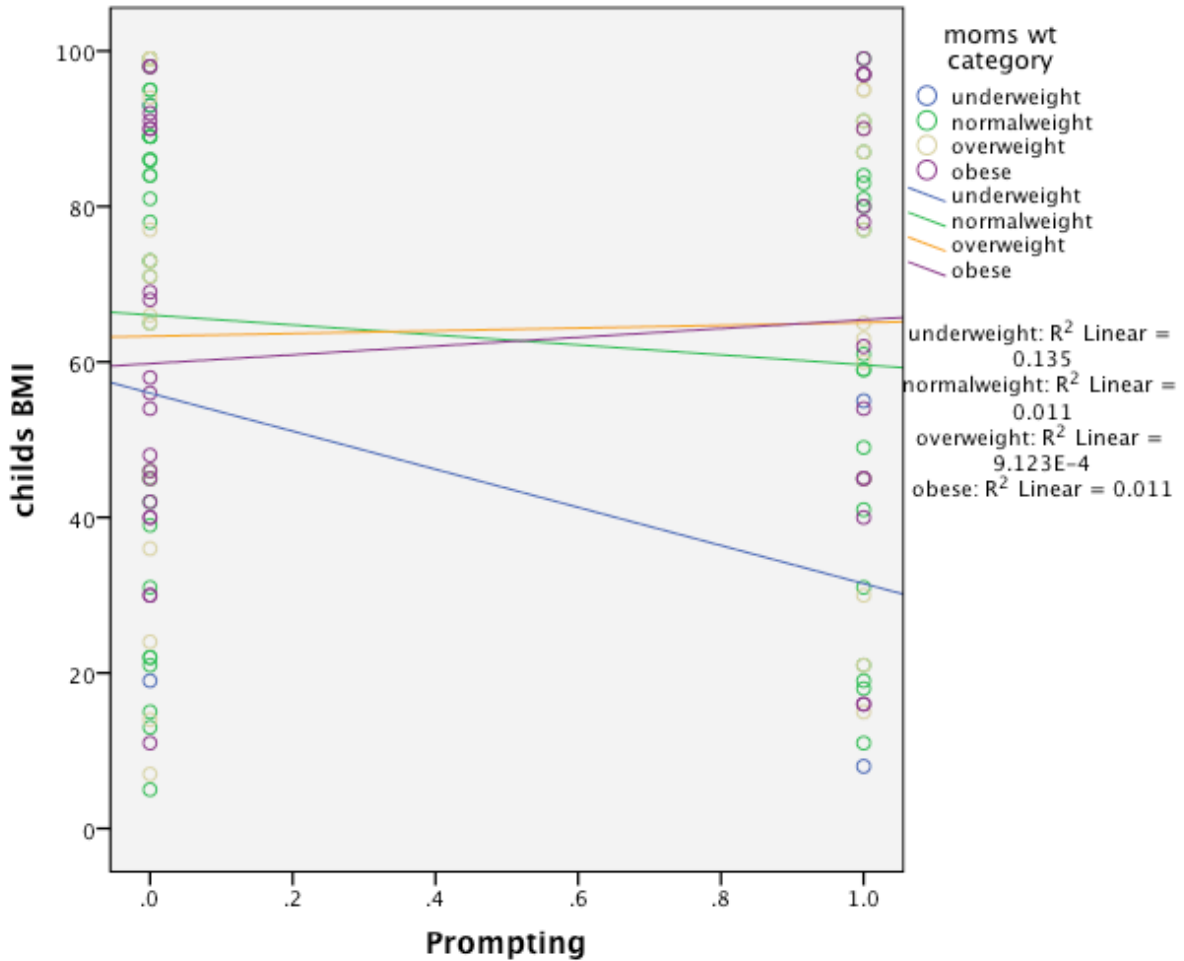


Table 25 provides the moderated regression analysis for the interaction of pregnancy and infancy factors with the authoritative feeding style from the CFSQ. Table 26 provides the moderated regression analysis for the interaction of pregnancy and infancy factors with the indulgent feeding style from the CFSQ. Table 27 provides the moderated regression analysis for the interaction of pregnancy and infancy factors with the authoritarian feeding style from the CSFQ. Table 28 provides the moderated regression analysis for the interaction of pregnancy and infancy factors with the control over eating feeding style from the PSFQ. Table 25 provides the moderated regression analysis for the interaction

of pregnancy and infancy factors with the prompting/encouraging feeding style from the PSFQ.

Table 25

*Moderated Regression Analysis; Effect of Pregnancy and Infancy Factors on Relationship of Authoritative Feeding Style from the CSFQ with BMI-for-age Percentile (N = 126)*

<b>Interaction</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b><math>\beta</math></b>	<b>t-statistic</b>	<b>Sig.</b>
	<b>B</b>				
Authoritative X Maternal Smoking	-.28	12.81	.01	-.02	.98
Authoritative X Maternal BMI @ Pregnancy	-1.56	1.26	-.60	-1.23	.21
Authoritative feeding X Maternal Breastfeeding	-9.63	13.22	-.20	-.72	.46

$F(7, 113) = .663, p = .70, R^2 .03$

Table 26

*Moderated Regression Analysis; Effect of Pregnancy and Infancy Factors on Relationship of Indulgent Feeding Style from the CSFQ with BMI-for-age Percentile (N = 126)*

<b>Interaction</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b><math>\beta</math></b>	<b>t-statistic</b>	<b>Sig.</b>
<b>B</b>					
Indulgent feeding X Maternal Breastfeeding	- 24.78	13.43	-.55	-1.84	.06
Indulgent feeding X Maternal BMI @ Pregnancy	.145	.71	.04	.20	.83
Indulgent feeding X Maternal Smoking	- 3.90	11.03	-.08	- .35	.72

$F = (7, 113) = .86, p = .53, R^2 = .22$



Table 27

*Moderated Regression Analysis; Effect of Pregnancy and Infancy Factors on Relationship of Authoritarian Feeding Style from the CSFQ with BMI-for-age Percentile (N = 126)*

<b>Interaction</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b><math>\beta</math></b>	<b>t-statistic</b>	<b>Sig.</b>
	<b>B</b>				
Authoritarian X	2.12	14.12	-.01	.15	.88
Maternal Smoking					
Authoritarian X	20.82	15.38	.56	1.35	.17
Maternal Breastfeeding					
Authoritarian X	-.07	.23	-.03	-.31	.75
Maternal BMI @ Time of Pregnancy					

$F(7, 113) = 1.66, p = .14, R^2 = .09$

Table 28

*Moderated Regression Analysis; Effect of Pregnancy and Infancy Factors on Relationship of Control over Eating Feeding Style from the PSFQ with BMI-for-age Percentile (N = 126)*

<b>Interaction</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b><math>\beta</math></b>	<b>t-statistic</b>	<b>Sig.</b>
	<b>B</b>				
Control over eating X Maternal smoking	-5.57	7.98	-.17	-.69	.48
Control over eating X Maternal Breastfeeding	9.45	12.23	.22	.77	.44
Control over eating X Maternal BMI @ Pregnancy	-1.30	9.53	.25	2.18	.11
<hr/>					
$F(6, 114) = .73, p = .62, R^2 = .03$					

Table 29

*Moderated Regression Analysis; Effect of Pregnancy and Infancy Factors on Relationship of Prompting/Encouraging Feeding Style from the PSFQ with BMI-for-age Percentile (N = 126)*

Interaction	Coefficient	Std. Error	$\beta$	t-statistic	Sig.
<b>B</b>					
Prompting/Encouraging	14.78	9.50	.17	1.55	.12
X Maternal					
smoking					
Prompting/Encouraging	-4.59	11.96	-.12	-.38	.70
X Maternal					
Breastfeeding					
Prompting/Encouraging	1.85	.70	.93	2.61	.01
X Maternal					
BMI @					
Pregnancy					

$F(7, 113) = 1.96, p = .06, R^2 = .10$

**Research questions 4d.** Is the relationship between the maternal behavior of food served and the BMI of a preschool-aged child moderated by maternal smoking, breastfeeding during infancy, or maternal BMI at the time of pregnancy?

This research question was analyzed with moderated regression. The predictor variable is the maternal behavior of food served, measured as the percentage of time the mother met the daily-recommended servings from the five food groups in a 24-hour

period. The outcome variable for the moderated regression procedure was the BMI-for-age percentile on the BMI growth curve. Transforming the original variables in SPSS created the interactions terms. In the moderated regression analysis all pregnancy and infancy factors were aggregated to determine which of the variables, if any, moderated the relationship between maternal feeding style and the child's BMI. The interaction terms were food served X smoking; food served X breastfeeding; and food served X mother's weight at time of pregnancy. None of the interaction terms were significant. Moderation did not occur. However, the interaction between food served and maternal smoking was approaching significance ( $p = .06$ ). Table 30 provides the regression analysis for the interaction variables.

Table 30

*Moderated Regression Analysis: Effect of Pregnancy and Infancy Factors on Relationship of Food Served and BMI (N = 126)*

Interaction	Coefficient	Std. Error	$\beta$	t-statistic	Sig.
Food served X Maternal Smoking	.07	.04	.21	1.89	.06
Food served X Maternal Breastfeeding	.01	.31	.01	.05	.95
Food served X Maternal BMI @ Pregnancy	-.001	.02	-.02	-.06	.94

$F(13, 98) = 1.23, p = .26, R^2 = .14$

### Summary

Results from the current study show that in a sample of low-income mothers, there was support for the theory of dependent care. Maternal beliefs were significantly associated with maternal behaviors, and maternal behaviors were associated with child health. Results also tested linkages implied, but not explicitly stated in the theory. Specifically, this study examined the interaction effect of maternal and child behaviors on child health outcomes, with few significant findings noted. These results are discussed in more detail in Chapter 5.

## **Chapter 5**

### **Discussion**

This study was conducted to examine the extent to which maternal beliefs and behaviors influenced a preschool-aged child's actual weight. Overall results showed partial support for the hypothesized relationships. This chapter will discuss key findings of the current study from both the descriptive analysis and in relation to the study aims. Current findings will be compared with results from other studies. The discussion will also present implications for practice, research, and theory, as well as address the strengths and limitations of the study. Final conclusions will then be presented.

### **Sample**

The sample in this study consisted of 126 mother/child dyads recruited from a Head Start program in southeast Michigan. Mothers who participated ranged in age from 20 to 45, with the majority having a high school education or equivalent. Children in the dyads ranged in age from 36 to 71 months.

All participants in this study lived at or below the level of poverty. The children were enrolled in the Women, Infants, and Children Supplemental Nutritional Program (WIC) and the mothers were eligible for food stamps. Consistent with requirements of the WIC program, all the mothers had received monthly nutrition counseling regarding healthy eating habits for their children.

Despite this the vast majority of the children in the study were not being offered a food from fruits, vegetables, milk, protein, or grains group at the USDA daily-recommended frequency. While the current study only measured frequency of food offered some comparisons to two national samples of other children enrolled in WIC can

be made. When compared to two national samples of other children enrolled in WIC, the current sample had some difference and similarities. Other children enrolled in WIC were getting the recommended number of milk and grain servings per day, but not enough protein, fruit, or vegetables each day (Fox & Cole, 2008; Nelson et al., 2006). Children in the current sample, were not receiving the recommended frequency of vegetables, but were being offered more than the recommended frequency of sweets, juices, and fats which is consistent with results from previous studies of WIC children (Fox & Cole, 2008; Nelson et al., 2006).

In addition to not meeting dietary frequency guidelines, the majority of the children were not meeting the American Academy of Pediatrics (AAP) (2012) guidelines of less than two hours of screen time per day. Preschool-aged children in the current study had a median screen time of three hours per day. Additionally, the children in the current study were not getting the recommended amount of daily physical activity. Both of these findings are similar to other children enrolled in the WIC program (Nelson, et al., 2006). While nationally approximately 16% of low-income preschoolers are considered overweight or obese (Ogden & Carroll, 2010), children in this study exceeded that average with 33% being overweight or obese. The higher rate of overweight or obesity in the current study may be a reflection of the child's diet, increased screen time, and lack of physical activity.

### **Maternal Beliefs**

#### **Maternal Perception of Child's Body Weight Status**

In this study, the author measured maternal perceptions of a child's weight. While some mothers misclassified their child's body weight status, most were more accurate

than what is reported in the current literature. The percentage of mothers who correctly identified their child's body weight status (51%,  $n = 64$ ) was higher than many of the results reported in the literature (Baughcum et al., 2000; Carnell et al., 2005; Eckstein et al., 2006; Gonzalez & Jadzinsky, 2006; Reifsneider et al., 2006). In contrast, mothers in the current study did not perform as well as parents in another study of children enrolled in WIC but not Head Start (Myers & Vargas, 2000). In that study, 65% of the parents had correct perceptions of their child's weight. The better overall rate of correct perception may be related to the methods in the Myers and Vargas study as well as the sample recruited. Parents were recruited to the Myers and Vargas study immediately after the child's height and weight had been obtained at the WIC office. Unlike the current study that included children of all weight status, the Meyers and Vargas study only included children who were overweight or obese. Additionally, Myers and Vargas included both mothers and fathers in their study. It is possible that fathers may have been better at identifying the child's body weight status than mothers, but there were only mothers in the current study.

Results from the current study were compared to a pilot study by Reifsneider and colleagues (2006) whose sample included children enrolled in Head Start, but not necessarily in WIC. Mothers in the pilot study only correctly identified the child's body weight status 36% of the time, which is a much lower accuracy than mothers in the current study (Reifsneider et al., 2006). However, the difference in correct perception needs to be interpreted cautiously due to the difference in methods used. Reifsneider and colleagues utilized the CDC teaching picture to help the mother identify her child's body



weight status while the current study only asked mothers in word description to identify the child's body weight status.

Results from the current study were also compared to studies that included parental perception of a child's body weight status, but whose children were not enrolled in WIC or Head Start. Correct perception in these studies ranged from 1.9% (Carnell et al., 2005) to 36% (Eckstein et al., 2006). Those two studies found no difference in fathers and mothers ability to correctly identify the child's body weight status.

Additionally, results from the current study were compared to studies that included only mothers, but whose children were not enrolled in WIC (Baughcum et al., 2000; Gonzalez & Jadzinsky, 2006). Mothers in the current study were found to be more accurate at correctly identifying their children's body weight status than the other two studies that included only mothers. Mothers in the current study were correct 51% ( $n = 64$ ), whereas correct perception for mothers in the other studies ranged from 2% (Gonzalez & Jadzinsky, 2006) to 21% (Baughcum et al., 2000). One reason mothers in the current study may have been better able to correctly perceive their child's body weight status was the fact that, unlike the other studies, the their children in the current studies were enrolled in Head Start. Head Start obtains heights and weights on all children every six months after which a registered dietician meets with mothers to counsel them about healthy eating. For this study children's heights and weights were obtained in October of 2011 and March of 2012. Data collection occurred from February 2012 until June 2012, thus all of the mothers would have completed the research packet after the October weight measurements had been made and the majority of mothers would have completed the packet after the March measurements had been completed.

While this would have contributed to mothers being more aware of their children's actual weights, this may also have contributed to a possible selection bias in the study.

### **Maternal Concern**

Another belief measured in the current study was maternal concern about a child's weight. Even though 33% of children in this study were overweight or obese based on BMI, an overwhelming number of mothers (92%,  $n = 117$ ) expressed the belief that they were not currently concerned about their child's body weight status. This held true for mothers of both boys and girls. For the few mothers who reported concern about their child's body weight status, an almost equal number were concerned about boys as were concerned about girls.

There are limited studies in the scientific literature that evaluate a mother's current level of concern about her child's body weight status. One study evaluated the mothers current concern as well as the mother's future concern about the child becoming overweight (Webber et al., 2010). In that study almost half of the participants expressed that they were currently concerned about their child's weight. This is not consistent with results of the current study, which showed that few of the mothers were concerned with their child's weight. The difference between the two studies may be related to sample composition. The Webber and colleagues (2010) study included older, school-aged children, not preschoolers, which were the focus of the current study.

One other study was found that examined maternal concern in a sample of preschool-aged children who were enrolled in WIC (Obeidat et al., 2009). The findings from that study were also inconsistent with results from the current study. In the current study only 7% of mothers agreed that they were currently concerned about their child's

weight as compared to 20% in the Obeidat study. One possible reason for the different results may be due to the fact that in the current study the majority of mothers believed their child to be either underweight or just the right weight. Only a few mothers perceived their child as being overweight and none perceived their child as being very overweight as compared to a larger percentage of the mothers believing their child was overweight or obese in Obeidat and colleagues study (2009). Thus a low level of concern is not unexpected in the current sample.

### **Maternal Nutritional Belief**

Based on the maternal beliefs survey utilized in this study, mothers displayed an average belief of the foods children need on a daily basis for a healthy diet. Higher nutritional belief scores were significantly associated with use of a healthy feeding style on both the Caregiver Feeding Style questionnaire (CFSQ) (authoritative) and Parental Feeding Style Questionnaire (PSFQ) (prompting/encouraging), and significantly inversely associated with one unhealthy style (control over eating). The mothers in the current study had lower nutritional belief than in the study conducted by Obeidat, Shriver, and Roman-Shriver (2010). In both studies, participants were low-income, enrolled in WIC, and included preschool-aged children. One possible reason for the discrepancy in nutritional belief between the two studies is the difference in methodology, specifically related to instrumentation. The results may be a reflection of the instruments utilized in the two studies. The survey in the current study was investigator created and test re-test reliability has not been established. In the study by Obeidat, Shriver, and Roman-Shriver (2010) study, the questionnaire had been reviewed for content validity and test re-test reliability had been established. Even given the

limitation with the survey in the current study, it was evident mothers had an average knowledge of the recommended daily servings of fruit, vegetables, protein, grains, and milk and dairy a child needed on a daily basis.

### **Maternal Belief of Child's Eating Style**

The last maternal belief evaluated in this study was that of the child's eating style. This was measured with one question that asked mothers to rate how picky or how well their child ate. Response choices ranged from very picky to a very good eater on a five-point scale. Responses were almost equal among all five choices with approximately 20% in each of the five categories. Since this was an investigator-created question, it is difficult to compare to other literature. To the author's knowledge this is the first study to evaluate mothers' beliefs about a child's eating behavior using only one question. Studies have evaluated children's eating utilizing the Child Eating Behavior Questionnaire (Wardle, Guthrie, Sanderson, and Rapport, 2001). However, these studies cannot be compared to the current study as the Child Eating Behavior Questionnaire measures different aspect of maternal belief about child eating style from the current study. The current study evaluated how picky or how good of an eater the mother believed the child to be. The Child Eating Behavior Questionnaire measures child food responsiveness, emotional over-eating, enjoyment of food, desire to drink, satiety responsiveness, slowness in eating, emotional under-eating, and food fussiness. The food fussiness scale does not measure if the mother believes the child is a good eater (Wardle et al., 2001)

## Maternal Behavior

### Feeding Style

The most frequently utilized feeding style questionnaire in the literature is the Child Feeding Questionnaire (CFQ) developed in 2001 by Birch and colleagues. The CFQ has been widely utilized in current research, however the CFQ evaluates only three feeding styles restriction, pressure to eat, and monitoring. Additionally, both the restrictive feeding style and pressure to eat feeding style have been reported to lead to unhealthy weights in children (Birch et al., 2001). For the current study the author wanted to add to the current literature about maternal feeding style by evaluating several styles that have been understudied in the current literature. Additionally, the author wanted to evaluate feeding styles that may be related to a healthy BMI-for-age percentile in children. To evaluate the feeding styles other than just restriction, pressure to eat, and monitoring, the CFQ was not utilized. Rather, the Caregiver Feeding Style Questionnaire (CFSQ; Hughes et al, 2005) and the Parental Feeding Style Questionnaire (PFSQ; Carnell and Wardle, 2002) were utilized the current study.

**Healthy/Unhealthy Feeding Styles.** To the authors knowledge this is the first study to classify the feeding styles from the CFSQ and PSFQ into healthy or unhealthy feeding style categories. Ten nationally certified pediatric experts classified the authoritative (CSFQ), prompting/encouraging, and control over eating (PSFQ) feeding styles as healthy and the remaining feeding styles of indulgent, authoritarian, uninvolved (CSFQ) and emotional and instrumental (PSFQ) as unhealthy. One feeding style, the control over eating, was reclassified during data analysis. The 10 pediatric experts originally classified the control over eating feeding style as healthy because they felt the

mother controlled what the child ate. For example, controlling how many sweets the child would have in one day. However, after the correlation matrix was analyzed, the control over eating feeding style was reclassified as an unhealthy feeding style as it was inversely correlated to the authoritative feeding style and to the prompting/encouraging feeding style. Additionally, the two healthy feeding styles of authoritative and prompting/encouraging were significantly correlated. Therefore, with two healthy feeding styles being significantly correlated (authoritative and prompting/encouraging) and both being inversely correlated to control over eating, the control over eating was re-classified to unhealthy.

It is interesting to note that the mothers were classified differently based on the two feeding style questionnaires. Of the 32 mothers who were classified as using the healthy authoritative feeding style on the CSFQ, 18 of them were also classified as using the unhealthy (control over eating) style on the PFSQ. The discrepancy may be a result of the differences between overall parenting styles and mealtime specific activities. The CSFQ was based on Macoby and Martins (1983) parenting styles, which are a reflection of overall parenting styles. The PSFQ on the other hand, evaluates mealtime specific behaviors. Since the CSFQ is a reflection of overall parenting styles, mothers who have an overall parenting style that is authoritative would most likely be classified as an authoritative feeder on the CSFQ. However, when examining mealtime specific behaviors, mothers may be found to be more controlling and classified as a control over eating when measured on the PSFQ, which is not a reflection of overall parenting style.

In the current study the mothers' primary feeding style on the PSFQ were either prompting/encouraging or control over eating. Similar to Wardle and colleagues (2002),

mothers in the current study did not primarily utilize the emotional or instrumental unhealthy feeding styles with their children. The fact that mothers do not demonstrate the use of emotional or instrumental feeding styles, as a primary method of feeding may be a reflection of the type of questions asked. Many of the questions related to the prompting/encouraging feeding style and the control over eating feeding style refer to a particular behavior that would occur every day such as “I allow my child to choose which food they eat for meals.” In contrast, questions on the instrumental and emotional scale refer to behaviors that most likely will not occur every day such as “I give my child something to eat to make him/her feel better when s/he is feeling upset” (Wardle et al., 2002). Behaviors that occur every day are more likely to be reflected in a primary feeding style as opposed to behaviors that may occur infrequently.

When mothers’ feeding styles were evaluated using the CFSQ, results were similar to the limited number of studies found in the current literature. The number of mothers classified as authoritative, authoritarian, indulgent, or uninvolved feeders were consistent with results of prior studies. In the current study, slightly more mothers were classified as utilizing an authoritative feeding style, there were 25% in the current study as compared 13% to 21% in other studies (Hennessy, Hughes, Goldberg, Hyatt, & Emonds, 2010; Hughes et al., 2005; Hughes et al., 2008). In addition, this sample’s median scores for the demandingness and responsiveness scales (from which the feeding style is determined) fell within the ranges of the current literature (Hennessy et al., 2010; Hughes et al., 2005; Hughes et al., 2008; Hughes, Powers, Papaioannon, Cross, & Nicklas, 2011). One reason the current study may have had slightly more authoritative

feeders is that only mothers were included in the current study, while the other studies above included both mothers and fathers.

**Healthy feeding styles and healthy behaviors.** In the current study, a significant association was found between the authoritative feeding style and food served. A mother who used an authoritative feeding style (a healthy feeding style) was shown to be more likely to serve fruit to the child and was less likely to serve the child vegetarian foods. These findings are consistent with results of recent studies that found that among children enrolled in Head Start, the authoritative feeding style was significantly related with attempts to get the child to eat more fruits (Hoerr et al., 2009; Patrick et al., 2005). In other studies the authoritative feeding style was associated with an increased availability of fruits, vegetables, and dairy and limited availability of sweets (Cullen, Baranuwski, Rittenberry, Cosart, Herbert, & de Moor, 2001; Gable & Lutz, 2000). This is in contrast to mothers in the current study, who were less likely to serve vegetarian foods even though they employed an authoritative feeding style.

**Prompting/Encouraging.** An interesting finding of the current study was the correlation between the prompting/encouraging feeding style and health behaviors. Specifically, the healthy prompting/encouraging feeding style was significantly correlated with maternal breast-feeding in infancy and increased physical activity in the child. To the author's knowledge this is the first study to evaluate the relationship between the prompting/encouraging feeding style and the behaviors of maternal breast-feeding and child's physical activity. Breast-feeding has been shown to have a beneficial effect on a child's weight (Toschke et al., 2002; Karaolis-Danckert et al., 2008). It is possible



that mothers who choose one type of healthy behavior, such as breast-feeding, may be more likely to employ other types of health behaviors such as a healthy feeding style.

### **Food Served: Child and Diet Evaluation Tool (CADET)**

While the Child and Diet Evaluation Tool (CADET; Cade et al., 2005) has been used in a number of prior studies, to the author's knowledge this is the first time it has been modified to reflect a typical American childhood diet. Examples of changes made include, adding oatmeal into the cereals category, fish sticks in the fish category and changing the milk to reflect the labels mother are familiar with in the US such as, whole milk, 2% milk, 1% milk, and skim milk. Mothers in the current study reported that the modified CADET accurately reflected foods they typically served to their child, with the exception of peanut butter, which was not added when the CADET was modified. Mothers reported they recorded peanut butter under spreads and protein. Consistent with prior studies (Cade et. al., 2005) mothers reported that the modified CADET was easy to use and understand. The survey instrument performed well in the current study for determining the frequency of foods the mother served to the child on one given day.

On a given day the mother recorded all the food she presented to the child utilizing the CADET on a gridded scoring sheet. Although food types were recorded, serving sizes were not recorded. A "food served" score was calculated based on the frequency with which a mother offered the child a food from the various food groups. Results from the CADET showed that none of the mothers offered the child a food from each of the five food groups at the USDA recommended frequency. The majority of mothers did not offer their child the USDA recommended frequency of foods from the fruit, vegetable, protein, milk and dairy, or whole grains group on the day they completed

the CADET. Mothers were also serving their children more than the recommended number of servings of fats, juices, and sweets. When mothers in the current study were compared to mothers in a study conducted by Nelson and colleagues (2006) they demonstrated similar behaviors, offering their children sweetened drinks and juice at a higher than recommended frequency and offering fewer vegetables than the recommended frequency standards. Additionally, the mothers in both studies were serving chips, cookies, and other sweets as snacks.

There were limitations with the use of the modified CADET in the current study. Two of the packets that were eliminated from analysis were done so because the mothers did not complete the CADET. This may have resulted from the issue of subject burden regarding the CADET. Another limitation is that while the instrument reflected the food the mothers served, it did not reflect the food the child consumed. A mother may have provided two servings of fruit for the child, but the child may not have eaten either serving of fruit. As the CADET does not reflect the food the child eats, this may be the reason the food served was not correlated to the child's BMI in the current study. Additionally, the CADET did not measure serving sizes of food, and this may be another reason the frequency of food served did not correlate to the child's BMI in the current study.

### **Specific Aims of the Study**

Guided by a mid-range theory substructured from the theory of dependent care (Taylor & Renpenning, 2011), this study was designed to determine the extent to which maternal beliefs and behaviors influenced the child's actual weight beyond the known risk factors for childhood obesity. Four specific aims were pursued to test the

hypothesized relationships. Specific aim one determined if maternal beliefs predicted maternal behavior. Aim two assessed whether maternal behaviors predicted the child's body weight status. Aim three examined the combined effect of maternal beliefs and maternal behavior on the child's body weight status. Finally, aim four assessed variables that could moderate the relationship between maternal behaviors and the child's weight.

### **Specific Aim One**

Specific aim one was to determine if maternal beliefs predicted maternal behavior. The maternal beliefs in aim one that were evaluated were maternal perception, maternal concern, and maternal knowledge. This aim sought to determine if maternal perception, concern, or knowledge influenced maternal feeding style or food served.

**Maternal perception.** In the current study the maternal belief of perception of child's body weight status did not predict the maternal behaviors of feeding style or food served. Only two other studies were found that evaluated maternal perception as a predictor of maternal feeding style (May et al., 2007; Webber et al., 2010). In these studies it was found that a mother's perception of child's weight significantly predicted the maternal feeding style of pressure to eat as measured on the Child Feeding Questionnaire. While the current study did not use the Child Feeding Questionnaire, none of the eight maternal feeding styles that were evaluated were found to be predicted by maternal perception. One reason maternal perception of a child's weight status may not have been significantly associated with feeding style is that the majority of mothers in the current study perceived their child as just the right weight. If a mother perceives her child as being the right weight, then her perception of her child's body weight status most likely will not influence her behavior.

In the current study there was no significant association between maternal perception of the child's body weight and the foods mothers served. The lack of a significant relationship may be the result of mothers only completing the CADET for one day. To the author's knowledge this is the first study that has evaluated the relationship between maternal perception of the child's body weight status and food served.

**Maternal concern.** Similar to maternal perception, maternal concern was not significantly associated with either the maternal behavior of feeding style or food served. This finding is in contrast with one other study (Webber et al., 2010) in which researchers found that current maternal concern about the child's weight was significantly associated with the maternal behavior of feeding style. Another study that evaluated maternal level of current concern did not evaluate maternal concern in relationship to maternal feeding styles (Obeidat et al., 2009).

However, maternal concern about a child's weight has been most frequently studied in relationship to the child becoming overweight. Future concern about the child becoming overweight has been studied in relationship to only a limited number of maternal feeding styles, with restriction and pressure to eat the most frequently studied styles (Gregory et al., 2010; May et al., 2007; Webber, et al, 2010. Neither of these feeding styles was evaluated in the current study.

Recent studies have evaluated maternal concern and maternal feeding style, with limited evaluation of the relationship between maternal concern and food served. A number of studies found that mothers who were concerned about their child's weight or concerned the child would become overweight were more likely to utilize a restrictive feeding style which affected the food served (Crouch et al., 2007; Gregory et al., 2010;

May et al.,2007; Webber et al., 2010). In one study that did evaluate the food the mother restricted, it was found that mothers who were concerned their child would become overweight restricted sweets, junk food, and the child's favorite foods (May et al., 2007). While other studies found that mothers who were concerned their child would become overweight did restrict the child's food, the authors did not specify the types of food the child was restricted from eating (Crouch et al., 2007; Webber et al., 2010). Additionally, mothers who were concerned their child was underweight were found to utilize a pressure to eat feeding style, but did not specify the types of food the mothers pressured the children to eat (Gregory et al., 2010).

In the current study, there was no significant association between the food mothers served and maternal concern about child's body weight status. This result may be due to the limited number of mothers who were concerned about the child's weight. In the current study, less 7% ( $n = 9$ ) of the 126 mothers were concerned about the child's weight as opposed to other studies where up to 50% of the mothers were concerned about the child's current weight (Obeidat et al., 2009; Webber et al., 2010). As discussed above in the section about maternal concern, the differences in the study results may be due to differences in the samples recruited.

**Nutritional belief.** The maternal nutritional belief was significantly associated with maternal behavior. Mothers with a higher nutritional belief were more likely to utilize a healthy feeding style (authoritative and prompting/encouraging) and less likely to utilize an unhealthy feeding style. To the author's knowledge this is the first study to classify maternal feeding styles as healthy and unhealthy and evaluate the relationship between maternal nutritional belief and maternal feeding styles.

Interestingly, although the mothers scored fairly high on maternal nutritional belief, their belief was not significantly associated with the maternal behavior of food served. This is similar to another study that found that maternal nutritional knowledge was not significantly associated with the child's vegetable or juice consumption but was significantly associated with fruit consumption (Gibson, Wardle, & Watts, 1998). One reason Gibson and colleagues (1998) may have found a significant relationship between Nutritional belief and food served but the current study did not was the method of evaluation. The current study only evaluated the foods the mothers served the child for one day as opposed to Gibson and colleagues (1998) who evaluated the child's diet over a three-day period. Had the current study evaluated the food served over three days, the current study may have also found the same significant relationship.

Similar to findings in the current study, it was found in another study that WIC mothers did not serve their children food that reflected the nutritional education provided by WIC (Nelson et al., 2006). In both studies, mothers provided more fruit juice than recommended. Additionally the majority of children snacked on sweets, chips and sweetened drinks.

Unfortunately, there is very limited information in the current literature related to maternal nutritional knowledge and the food that is served to children. Even in the national report *Diet Quality of American Young Children by WIC Participation Status* (Cole & Fox, 2008), which evaluated the dietary habits and food intake of children enrolled in WIC, mothers' nutritional knowledge was not directly measured.

**Child's eating style.** Lastly, a significant association was found between the maternal belief of child's eating style and healthy feeding style. Mothers who thought

their child was a good eater were more likely to use the healthy authoritative feeding style. As previously stated this belief was analyzed utilizing only one question and to the author's knowledge is the first time this relationship has been evaluated in this manner, thus there is no other literature with which to make comparisons. One possible explanation for the relationship that was noted is that if mothers perceive their children as a good eater then it may be easier to utilize an authoritative feeding style. Good eaters are more likely willing to accept a wide variety of foods than a picky eater, making it easier for the mother to offer choices in an authoritative rather than controlling manner.

Specific aim one was partially supported. Results indicate that different types of beliefs have different predictive ability. The current study found that beliefs the mother considered on a daily basis (e.g., Nutritional belief of healthy food to feed her child, or belief about the child's eating habits) were significantly associated with maternal feeding style. However, beliefs the mother does not typically think about on a daily basis (e.g., perception and concern about child's weight) were not significantly associated with the maternal behavior of feeding style. Neither type of belief was significantly associated with maternal behavior of food served. In summary, maternal beliefs that influence daily decisions about the child's eating were found to be significantly associated with one aspect of maternal behavior, feeding style, but not with the maternal behavior of food served.

### **Specific Aim Two**

Specific aim two was to determine the extent to which maternal behaviors predicted a child's body weight status. The behaviors that were evaluated in specific aim two were the maternal behavior of feeding style and food served as evaluated utilizing the

CSFQ, PSFQ, and the CADET. The outcome of interest was the child's BMI-for age-percentile.

**Food Served.** As presented earlier in this chapter, no significant association was found between the maternal behavior of frequency of food served of food served and the child's body weight status. This may be because the instrument used in this study only recorded food the mother served, not the serving size, and also did not measure the amount of not food the child actually consumed. In addition, the mothers only completed the food survey for a one-day period. Results may have been different if the mothers had completed a three-day diary versus a one-day diary. However, given that research packets had to be eliminated because mothers did not complete the CADET for a one-day period day, three days would have increased subject burden, and potentially affected return rates.

**Feeding Styles.** In addition to food served, healthy and unhealthy feeding styles were evaluated in relationship to the child's body weight status. Only one maternal behavior was found to predict a child's body weight status. Results show the unhealthy authoritarian feeding style was significantly associated with a lower BMI-for-age percentile in the preschool-aged child. This significant association was an unexpected finding. It is possible that the relationship was bidirectional and mothers based their feeding style on the child's body weight status (e.g., it may have been the mothers belief about the child's weight that influenced the feeding style as opposed to the feeding style influencing the child's weight). Additionally, mothers may have been using the authoritarian feeding style as they felt they should control what and when the preschool-age child eats because the child is too young to make these decisions. These results



should be interpreted with caution however, as the authoritarian feeding style only explained a very small amount of the variance in the child's BMI.

While limited studies have utilized the CSFQ when evaluating the relationship between parental feeding style and a child's BMI, the significant association between the authoritarian feeding style and a child's BMI found in the current study supports the results of previous studies (Hoerr et al., 2009; Hughes et al., 2005; Hughes et al., 2008). All three of these studies had samples that consisted of low-income parent/child dyads.

In contrast to the current study, other studies that have utilized the CSFQ have found a significant association between the indulgent feeding style and a higher BMI in the child (Hennessy, et al., 2010; Hughes et al., 2005; Hughes et al., 2008; Tovar, Hennessy, Pirie, Must, Gute, Hyatt et al., 2012). The difference in findings again may be due to differences in sample composition. In three studies, the feeding style of both mothers and fathers were examined (Hennessy et al., 2010; Hughes et al., 2005; Hughes et al., 2008). One study that specifically focused on mother/child dyads did so with a sample of recent immigrants to the United States. In addition, that study and one other (Hennessy et al., 2010) included older children up to the age of 12. The age difference may have affected feeding style. Mothers of older children may not feel they need to control older children's eating and therefore would be considered more indulgent in their feeding style, allowing the children to make more of their own food choices.

Other studies that have examined a child's BMI in relation to parental feeding style used the Child Feeding Questionnaire, rather than the CFSQ or PSFQ. Those studies have reported conflicting findings. Some have found a restrictive feeding style associated with increased BMI (Birch et al., 2001; May et al., 2007). Others found the restrictive

style associated with increased BMI but only in boys, not girls (Blissett et al., 2006). Lower BMIs were found to be associated with the pressure to eat feeding style (Powers et al., 2006). Yet a number of other studies found no significant association between any parental feeding style and a child's BMI (Gregory et al., 2010; Haycraft & Blissett, 2008; Vereecken et al., 2010; Wardle et al., 2002). The different findings regarding the relationship between feeding style and the child's current weight may be a result of method bias rather than reflecting true association among the variables. Each of the studies cited utilized a cross-sectional design. However determining the relationship between feeding styles and a child's BMI may need to be evaluated overtime, just as a child's growth and development is evaluated. A longitudinal study may be required to find a significant association between maternal feeding styles and a child's BMI-for-age percentile. Additionally, it is possible the preschool years may be too early to find a significant association between maternal feeding style and the child's BMI. It may be more important to study the behaviors associated with the feeding styles (e.g., authoritative mothers are more likely to serve fruit, prompting/encouraging mothers more likely to encourage physical activity in the child) as these behaviors influence the child's developing food preferences and eating patterns that will last a lifetime. Therefore, it is possible that that the overall maternal feeding style does not influence the child's BMI until later in life.

Based on the findings, Aim two was partially supported. The maternal behavior of food served was not significantly associated with the child's weight. Although the maternal behavior of feeding style was significantly associated with weight, it was not in the hypothesized direction.

### Specific Aim Three

Specific aim three was to determine the combined effect of maternal beliefs and maternal behaviors on a child's body weight status. All the maternal beliefs (perception, concern, and Nutritional belief) and feeding styles (authoritative, authoritarian, indulgent, and control over eating) measured in this study were evaluated to determine which was predictive of the child's BMI-for-age percentile. Of all seven predictors, the only significant association was maternal perception of the child's body weight status (i.e., mothers perception of children's body weight status was congruent with the child's actual body weight status). To the author's knowledge this is the first study that has evaluated the relationship between maternal perception and the child's BMI-for-age percentile. The current literature revolves around accuracy of perception of the child's body weight status or examines perception-influencing behavior, but does not examine perception as a predictor of the child's actual weight.

While maternal perception was found to be significantly associated with the child's body weight status, it only explained a small amount of variance in BMI. As such, these results need to be interpreted with caution. As stated earlier, nutritionists at Head Start would have notified mothers of the child's body weight status prior to the start of data collection. At that time the mother would have been educated about the child's BMI-for-age percentile, which could have influenced the mother's perception of the child's weight. In addition, several of the mothers in the current study expressed concern about their child's weight, which would be related to their perception of their child's weight. Therefore, it is possible that there was selection bias such that mothers who were

concerned about their child's weight may have self-selected to be in the study, increasing the likelihood of perception being associated with BMI.

Specific aim three was not supported. Based on the theoretical framework, the relationship between beliefs and health should have been mediated by maternal behavior, and this did not occur. Instead, results indicated a significant relationship between one maternal belief (perception) and the child's health, representing a path that is not hypothesized in the theory of dependent care (Taylor & Renpenning, 2011).

#### **Specific Aim Four**

Specific aim four was to determine the extent to which the relationship between maternal behaviors and the body weight status of a preschool-aged child is moderated by either the child's behavior and/or pregnancy and infancy factors. Two significant associations were found. First screen time moderated the relationship between an indulgent feeding style and the child's BMI-for-age percentile. Second, a mother's BMI at the time of pregnancy moderated the relationship between a prompting/encouraging feeding style and the child's BMI-for-age percentile. The maternal behavior of food served did not moderate any of the relationships between maternal feeding styles and the child's BMI-for-age percentile.

**Indulgent Feeding Style and Screen Time.** Results of this study showed that screen time moderated the relationship between an indulgent feeding style and the child's BMI-for-age percentile. Mothers who were indulgent feeders and allowed more than two hours of screen time per day had children with higher BMI-for-age percentiles than indulgent mothers who limited the child's screen time to less than two hours a day. The

association between indulgent feeding and screen time and a child's BMI-for-age percentile may be a reflection of an overall parenting style.

According to Braumbid (1971), an indulgent parent is one who is permissive or non-directive. Indulgent mothers have few behavioral expectations for the child. Indulgent mothers are very nurturing and warm, however, they do not expect the child to behave or for children to regulate any of their behavior (Braumbid, 1971). Indulgent mothers may allow children to have an excessive amount of screen time because indulgent mothers do not make demands on their children, such as turning off the television and engaging in physical activity or active play. This finding may be a result of determining feeding style based on the CFSQ, which is a reflection of parenting styles.

Two recent studies found a significant relationship between the unhealthy, indulgent feeding style and an increased BMI in children (Hennessy et al., 2010; Hughes et al., 2008). This finding is in contrast to the current study in which an indulgent feeding style was not significantly associated with BMI. One reason for the difference in findings may be the other studies had more parents classified as using the indulgent feeding style than any other type of feeding style, while the current study had a fairly even distribution between multiple maternal feeding styles. Additionally, the two other studies (Hennessy, et al 2010; Hughes, et al., 2008) included both mothers and father in their study, and did not differentiate between maternal and paternal feeding styles, whereas only mothers were evaluated in the current study. One additional reason for the increased number of indulgent feeders in the study conducted by Hennessey and colleagues (2010) is the age of the children in the study. That sample had children aged six to 11. Parents of children in this age range may feel that these children are capable of feeding themselves and

getting their own snacks and drinks. This is in contrast to three to five year old children who most likely will need at least some help in getting drinks and snacks. Parents who allow children to get their own food, drinks and snacks may be more likely to be classified as an indulgent feeder than parents who do not.

**Prompting/Encouraging Feeding Style and Pregnancy/Infancy Factors.** A mother's BMI at the time of pregnancy was found to moderate the relationship between a prompting/encouraging feeding style and the child's BMI-for-age percentile. In addition, the prompting/encouraging feeding style was significantly correlated with the healthy behaviors of maternal breast-feeding in infancy and physical activity in the child. Even with these healthy behaviors, mothers who utilized the prompting/encouraging feeding style but were overweight or obese at the time of pregnancy had children with BMI-for-age percentiles that were higher than those of children whose mothers were normal weight or underweight at the time of pregnancy. One reason maternal overweight or obesity at the time of pregnancy may have moderated the relationship between feeding style and the child's BMI-for-age percentile is that over half the mothers ( $n = 65$ ) in this study were overweight or obese at the time of pregnancy. This large number may account for moderating effect of mothers' BMI at the time of pregnancy.

While studies in the current literature have not evaluated feeding style and mother's BMI, it is well documented that a risk factor for early onset obesity (in the preschool years) is maternal overweight or obesity at the time of pregnancy (Kitsantas et al., 2010; Whitaker, 2004). In one study, 24% of low-income children sampled were overweight by the age of four if the child's mother was obese at the time of pregnancy (Whitaker, 2004). Another study demonstrated that a child whose mother was overweight

or obese at the time of pregnancy was more likely to be overweight during the preschool years (Kitsantas et al., 2010).

Results provide partial support for Aim four in that some known factors associated with early onset childhood obesity moderated the relationship of maternal behavior (feeding style) with the child's BMI. These findings suggest further areas of research and intervention are needed. The significant association between screen time and indulgent feeding style may be more a reflection of overall indulgent parenting behaviors, which are then reflected in feeding style. This may indicate that it is important to study other behaviors associated with feeding styles rather than just the feeding style itself. Additionally, the moderating effect of the mothers' BMI at the time of pregnancy suggests that prevention of childhood obesity needs to begin with women's health behaviors before pregnancy as well as focusing on parenting style during the preschool years.

**Summary of Specific Aims.** The purpose of the study was to determine the extent to which maternal beliefs and behaviors regarding the child's body weight status influenced the child's actual weight beyond the known risk factors for childhood obesity. The central hypothesis of the current study was that together maternal beliefs and behaviors would predict a child's body weight status. Results of this study indicate the central hypothesis was partially supported. A child's BMI-for-age percentile during the preschool years is complex interplay of variables. During the preschool years, it may be too early to see a significant association between maternal feeding styles and the child's BMI-for-age percentile. Maternal beliefs did predict maternal behavior in the current study. Additionally, there were parenting and child behaviors associated with specific

feeding styles. Results from the study indicate that it may be just as important to study the different behaviors associated with each feeding style and how these behaviors influence the child's developing eating patterns and preferences during the preschool years

### **Study Strengths and Limitations**

#### **Study Limitations**

As with all studies, there were limitations noted that need to be considered when examining the results. Specifically, eight limitations were identified. First, feeding a preschool-aged child is an interactive process, however eating behaviors of the children participating in this study were not measured. Feeding styles are behaviors that mothers use to develop, maintain, or change a child's eating behaviors. While the mother uses one or more of the behaviors associated with a particular feeding style, the child will exhibit a response to the mother's behavior. A limitation of the current study is that it did not evaluate the child's response to the mother's feeding style behavior. The only evaluation of the child's eating behavior was a question included in the maternal beliefs survey regarding the mother's perception as to whether the child was a picky or good eater. Future qualitative studies should evaluate the interactions that occur between the mother and the child during mealtimes.

A second limitation concerns a possible selection bias in the study. Of the 504 possible participants, 170 (33%) consented to participate. Of the 170 that agreed to participate 130 (76%) actually completed the research packet and returned it to the principal investigator. During data collection, it was noted that as mothers turned in their completed research packets, many expressed concern about their child's weight. Mothers



were aware of their child's weight because of a requirement of the Head Start program for the measurement of a child's height and weight every six months. These measurements were included in the data collection for this study. If, based on these measurements, mothers had been counseled by Head Start dietitians regarding nutritional requirements, they may have self-selected into the study as a means of learning more about their child's eating behaviors, nutritional needs, and weight management. It is possible the outcomes noted could reflect group differences of mothers who participated versus mothers who did not participate in the study.

Third, there were limitations with the methods employed for this study. As discussed in Chapter 3, the data collected was all cross-sectional. Typically, a child's growth is measured over time, not evaluated based on a single measurement. The results of this study may have been different had the child's BMI-for-age percentile been evaluated over at least a year. Also, a limitation with cross-sectional data is temporal ambiguity. Temporal ambiguity is a common limitation in correlational studies as the researcher is unable to determine if the predictor variable is influencing the outcome variable or vice versa (Polit & Beck, 2012). Finally, the maternal BMI of participants in this study was evaluated using a self-reported retrospective method. Self-report may have biased the data collected in that mothers may not have remembered their correct weight at the time of pregnancy.

A fourth limitation of the current study is that the maternal belief and child activity surveys were investigator created. Neither of the instruments had been previously utilized and test-retest reliability had not been established. If these surveys are to be utilized in future studies, test-retest reliability will need to be established. Also, the

maternal beliefs survey would benefit from adding the serving sizes for each of the food groups being evaluated. Lastly, the checklist on the CADET would benefit from having serving sizes for each group of food. It cannot be assumed that a check mark on gridded sheet is equivalent to the correct serving size.

Another limitation of the study was history. During the data collection phase of this study, the USDA was promoting its new “My Food Plate” eating program. While the program did not affect the outcome variable of maternal feeding style, it may have affected the results of food served to the child. In addition, the new eating program may also have affected the descriptive data of maternal beliefs about the number of servings a child needs each day from the protein, whole grains, milk and dairy, fruit, and vegetable food groups.

Lastly, the final limitation of this study is generalizability. Results from the current study can only be generalized to a population with similar characteristics, specifically low-income mothers of preschool-aged children who are enrolled in WIC. Mothers whose children are enrolled in WIC are required to go to the WIC office every three months and receive nutritional counseling. The WIC program provides age-appropriate foods for children ages newborn to five years with specific foods each month. While WIC encourages breast-feeding, they provide formula for a full year for an infant whose mother decides not to breast-feed. The counseling provided by WIC may have influenced the beliefs of mothers who participated in this study. It is also possible that food served by mothers may have been influenced by food provided by the WIC program. For example WIC provides 128 ounces of juice each month for each child aged two to five in families enrolled in the program. Mothers may have thought they were

required to give their children the entire amount provided. Therefore, results of the current study are only generalizable to mothers of preschool-aged children who are enrolled in WIC.

### **Study Strengths**

Despite its limitations there are still strengths of this study. Along with its limitations this study demonstrated five strengths.

One noted strength was the performance of the feeding style instruments. While each performed differently, the internal consistency for the PFSQ was greater than or equal to 0.70. For the CSFQ the responsiveness scale was 0.67 and the demandingness scale was 0.82. Further, the use of these two instruments begins to fill a gap in the current literature about maternal feeding styles other than restriction and pressure to eat as studied in an at-risk group of low-income preschool-aged children.

A second strength of this study was by focusing on low-income mother/child dyads, it addressed a population that is at highest risk for early onset pediatric obesity. Currently in the U.S., one in seven low-income preschoolers are overweight or obese.

A third strength of the study is that the results provide new information about the two feeding style questionnaires. To the author's knowledge the current study is the first to classify the feeding styles as healthy and unhealthy. By classifying the maternal feeding styles as healthy/unhealthy important differences were revealed in the two instruments. For example, a mother may utilize an authoritative feeding style as a reflection of her parenting style when evaluated with the CFSQ. However, when the mother's mealtime specific feeding practices were evaluated on the PSFQ, that same mother may demonstrate a more controlling maternal feeding style of control over eating.

The fourth strength of the study was the return rate. Of the mothers who participated in the study, 75% returned the data collection packets. According to Polit and Beck (2008) a return rate greater than 65% is acceptable. The reasons for this high rate of return may have been the presence of the primary investigator at least three out of four school days at the Head Start location. The high rate of return ensured that the sample size of 126 participants was large enough to run all planned statistical analyses.

Lastly, the current study begins to fill the gap by providing a guiding theoretical framework for studying early onset obesity in childhood. Other studies that have evaluated the relationship between maternal feeding style and a child's BMI have been atheoretical or have not shown the connection to an overarching theoretical framework. The results from the current study provide partial support for the hypothesized relationships in the theory of dependent-care (Taylor & Renpenning, 2011). Additionally, other theoretical linkages were identified between the maternal behaviors of feeding style and food served. Lastly, the current study showed how the relationship between maternal behaviors and the outcome of health may be bidirectional.

In addition to the strengths listed above, results from this study contribute to the state-of-the science of pediatric obesity and the influence of maternal behaviors on child health. First, is the knowledge that the PSFQ and CSFQ instruments perform differently. When maternal feeding styles were examined, mothers were found to utilize a healthy feeding style on one questionnaire and an unhealthy feeding style on the other. This may have been a result of the difference between one instrument (CSFQ) measuring overall parenting styles, while the other (PFSQ) measured mealtime specific activities. At the same time, the authoritative feeding style on the CFSQ was significantly, positively

associated with the prompting/encouraging feeding style, and significantly inversely correlated to the control over eating feeding style on the PSFQ. It is important to know that the feeding style of control over eating, which may be thought by some to be a healthy feeding style, is actually an unhealthy feeding style to use with children. It may lead to parents over controlling the child's food choices and food intake. Also, the healthy prompting/encouraging and authoritative feeding styles were significantly associated with higher Nutritional belief. Thus, increasing a mother's Nutritional belief may be associated with increased use of one of the two healthy feeding styles, which may result in improved child outcomes.

In addition, this study provided important information regarding other maternal and child behaviors that are significantly related to maternal feeding style. Mothers who used a prompting/encouraging feeding style were more likely to have breast-fed their child as an infant. In addition, their children were more likely to participate in physical activity. The authoritative feeding style was found to be correlated to the number of hours the child sleeps at night. The more authoritative the mother the more sleep the child gets at night. Sleep is a healthy behavior that helps prevent early onset childhood obesity. A lack of sleep is a known risk factor for early onset childhood obesity (Taheri, 2006).

Lastly, knowledge that a mother's BMI at the time of pregnancy moderates the relationship between a healthy feeding style and the child's BMI is a new contribution to the literature. Results of this study showed that maternal BMI at the time of pregnancy significantly moderated the relationship between the healthy feeding style (prompting/encouraging) and the child's BMI-for-age percentile regardless of whether mothers utilized other healthy behaviors, such as breast-feeding and encouraging their

children to be physically active. In addition, while not statistically significant, mothers who were normal weight or underweight at the time of pregnancy and used a prompting/encouraging feeding style had children with lower BMI's than mothers who were over weight and utilized a prompting/encouraging feeding style.

## **Implications**

### **Theoretical Implications**

Results from the current study provide some support for the utilization of the theory of dependent-care (Taylor & Renpenning, 2011) in the study of childhood obesity. Dependent-care agency (DCA) substructured as maternal beliefs was shown to be significantly associated with dependent-care actions (maternal behavior). Specifically, the maternal nutritional belief was significantly associated with the maternal behavior of feeding style. There was also a significant association between the maternal beliefs regarding the child's eating style and feeding style. No maternal beliefs were found to be significantly associated with the maternal behavior of food served.

Only one dependent-care action (feeding style) was shown to be significantly associated with the child's health (BMI), but in an unexpected direction. The other dependent-care action examined in this study (food served) was not found to be significantly associated with the child's BMI. In addition the relationship of feeding style to the child's health (BMI) was found to be moderated by both pregnancy/infancy and child activity factors.

There were relationships that were not accounted for in theory of dependent-care (Taylor & Renpenning, 2011). Specifically, maternal BMI at the time of pregnancy was found to moderate the relationship between current maternal behavior

(prompting/encouraging feeding style) and the child's BMI-for-age percentile. Another relationships that was not specifically addressed, but could be implied from the theory of dependent-care was the significant association noted between the two maternal behaviors of feeding style and types of food served to the child. For example, mothers who utilized the authoritative feeding style were more likely to serve fruit to the child and less likely to serve vegetarian foods to the child.

Theoretical results from the current study need to be interpreted with caution as each of the significant associations only explained a small amount of the variance in the outcomes and the correlations were weak. While the results from the current study need to be interpreted with caution, the theory of dependent-care (Taylor & Renpenning, 2011) provides a researcher with a guiding theoretical framework for studying obesity in the preschool-aged child. When utilized in the future, a researcher may want to consider using the behaviors associated with the different feeding styles as DC actions. An additional linkage should be added to the theory that would allow examination of correlations among sets of beliefs and/or sets of behaviors. Overall, the theory of dependent-care provides a guiding framework for at least studying the relationship between maternal beliefs and behaviors in regards to a body weight status.

### **Implications for the Discipline of Nursing**

#### **Implications for Nursing Science**

Barrett (2002) defines nursing science as “the substantive discipline specific knowledge that focuses on the human-universe-health process articulated in the nursing framework and theories” (pg. 57). The current study helps to build nursing science by utilizing an extant nursing theory and providing some support for the theory of

dependent-care. Congruent with the theory of dependent-care (Taylor & Renpenning, 2011) dependent-care agency (maternal beliefs) predicted DC actions (maternal behavior), and DC actions (feeding style) were associated with the dependent child's health outcome.

### **Implications for Nursing Practice**

According to Donaldson and Crowley (1978) a discipline needs not only a unique body of knowledge that is the science of the discipline; it also needs knowledge that is useful for practice. In addition to making contributions to nursing science, results of this study provide important information that is useful for clinical practice. Results of this study demonstrated a significant relationship at the theoretical level. Maternal beliefs influenced maternal behavior, which in turn influenced the child's health. Therefore, clinical implications need to be directed at changing maternal beliefs and behaviors. During the preschool years a child's preferences and food consumption patterns are developing. The relationship between maternal beliefs and maternal behavior could have important implications for clinical practice before and during the preschool years as this is the time when children stop eating only because they are hungry and start eating as to how they are socialized to the eating environment (Hughes et al., 2005). An authoritarian mother forces the child to eat certain foods and restricts the child from other foods. The authoritarian feeding style does not allow for the children to make their own choices based on preference (Patrick et al., 2005). During the preschool years this can lead to a lower BMI-for-age percentile, however, this may not be true for the child later in life. It has been theorized that parents who are over controlling about children's food intake may lead to the child developing the inability to self-regulate food intake in turn leading to



overeating in the future. When parents are over controlling with food, children learn to respond to the parents external cues about when and how much to eat instead of responding to feelings of hunger and satiety (Jansen et al., 2007).

In addition, findings of this study have implications for how a primary care provider conducts a nutritional history with parents of preschool-aged children. While providers need to continue to ask about the amount and types of foods the child is eating, additional questions about how the child is being fed should be included. Some examples of questions providers should ask include (a) who selects the food the child eats at meals? (b) Who selects snacks for the child? (c) Does the child eat when they are hungry or does someone else decide for them when they will have a meal or snack? and, (d) who decides when the child is done eating? These questions will help the provider assess how controlling the parents are in terms of the child's eating during the preschool years when the patterns that last a lifetime are being developed. If the mother's answers reflect that she controls the types and amounts of food the child eats, the mother is more controlling or authoritarian in her feeding style. If the mother allows the child to participate and make decisions about the food they eat, when they eat, and when they are full, the mother is more of an authoritative (healthy) feeder. The provider can then base the needed anticipatory guidance on the responses to the questions. The provider can then decide whether information about feeding styles needs re-enforcement or if a maternal belief or behavior may need to be addressed and education provided.

Primary care providers should begin discussing the behaviors associated with the authoritarian (or controlling type) and authoritative (prompting/encouraging type) feeding styles in their anticipatory guidance prior to the age of three and continue through the

preschool years. The anticipatory guidance should include teaching about the potential risks to completely controlling what the child eats. Parents should be informed an authoritarian type feeding style has the potential to disrupt the development of the child's ability to determine when they are full which can lead to potential overeating later in childhood (Jansen et al., 2007). Another important teaching point with parents is how children may respond to foods they have been previously restricted from eating. Children tend to choose the foods they have been restricted from as opposed to the foods that have been allowed and thus, they may overeat the restricted food such as sweets and sweetened drinks (Gregory et al., 2010).

Practitioners need to understand and counsel the parents about the behaviors associated with different feeding styles. For example, healthy feeding styles are associated with offering children a wide variety of tastes and foods. Additionally, practitioners need to provide anticipatory guidance regarding the behaviors parents model during the preschool years. Parents need to understand that eating patterns are established during the preschool years, based largely in response to the behaviors associated with maternal feeding styles. These habits and patterns tend to last a lifetime and may have a significant effect on the child's weight later in life.

An additional implication for practice is counseling parents about the child's body weight status. Practitioners need to ask parents how they view their child's weight. If the parent can correctly identify the child's weight status, then education can be based on the child's current weight status. If the parent identifies the child as normal weight when the child is actually overweight or obese, the practitioner will need to start with education regarding the child's actual body weight status.

A final implication for clinical practice is counseling about how a mother's BMI at the time of pregnancy may influence the child's weight during the preschool years. Practitioners who work with woman who are considering becoming pregnant need to counsel woman who are overweight or obese that their current weight may very well lead to a child who is overweight or obese by the preschool years even if the mother uses a healthy feeding style. Mothers should be counseled that even measures that are protective against childhood obesity, such as breastfeeding and encouraging physical activity in the young child, may not be enough to overcome the mother being overweight or obese at the time of pregnancy

### **Implications for Research**

Several implications for future research have emerged from the current study. First, the relationship between maternal feeding styles and a child's BMI-for-age percentile should be evaluated in a longitudinal study. This will allow researchers to evaluate the child's BMI-for-percentile over time and look at trends. These trends may reveal important information about the relationship between maternal feeding styles and the child's BMI-for-age percentile, and provide evidence as to which feeding styles lead to healthy/unhealthy child weight.

Second, qualitative research studies need to be developed that will evaluate the interaction between a mother and child in the eating environment. While a mother may utilize a particular feeding style, the child will respond to behaviors the mother demonstrates when feeding the child. In-home observational studies would allow for evaluation of the interaction between the mother and the child. While a mother's responses on feeding questionnaires may classify them as a particular feeding style,

different information may be obtained from an observational study. It may be that mothers use a variety of styles based on the child's response. These variations would not be reflected in a questionnaire, but could be discovered in an observational study.

Future mixed methods studies are needed to conduct a longitudinal study with a sample of low-income preschoolers evaluating maternal feeding styles and BMI-for-age percentiles over time. A study of this type would allow the researcher to evaluate the maternal feeding style based on a questionnaire and on direct observations and determine if there is congruency between the two. This type of study would also allow the researcher to observe the interaction between the mother and child during mealtimes.

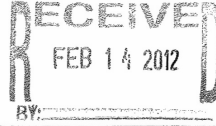
### **Conclusion**

In summary, the current study begins to fill gaps in the literature regarding maternal beliefs and behaviors as they relate to early onset childhood obesity. Maternal beliefs and behaviors influence a child's health in a complex means that cannot be fully evaluated in a cross-sectional manner. The effects of maternal feeding style may not be seen during the preschool years, yet the behaviors associated with feeding styles may influence the child's developing food preference, eating patterns, and BMI later in life. Additionally, maternal feeding styles need to be evaluated in relationship to the behaviors such as the food the mother serves and allowing the child to select what they want to eat from a selection of healthy choices as these behaviors are modeled daily for the child. Because children learn by patterning what is modeled for them, these behaviors could influence the child's current BMI-for-age percentile and the child's future body weight status.

Preventing early onset childhood obesity is a complex and multifactorial and involves more than physical activity and healthy eating. Around the age of three children stop eating based on deprivation and start eating based on how they are socialized to the eating and mealtime environment (Hughes et al., 2006). Socialization to the eating and mealtime environment occurs largely through the patterning of the behavior that is modeled by the child's mother. To help prevent early onset childhood obesity greater understanding of the role of maternal beliefs and maternal mealtime behaviors is needed.

## APPENDIX A: IRB APPROVAL

WAYNE STATE  
UNIVERSITY



IRB Administration Office  
87 East Canfield, Second Floor  
Detroit, Michigan 48201  
Phone: (313) 577-1628  
FAX: (313) 993-7122  
<http://irb.wayne.edu>

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**NOTICE OF EXPEDITED APPROVAL**

To: Nicole Boucher  
College of Nursing  
From: Dr. Scott Millis *B. Campbell - Vogt*  
Chairperson, Behavioral Institutional Review Board (B3)  
Date: January 19, 2012  
RE: IRB #: 129111B3E  
Protocol Title: The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children  
Funding Source:  
Protocol #: 1201010498  
Expiration Date: January 18, 2013  
Risk Level / Category: Research not involving greater than minimal risk

The above-referenced protocol and items listed below (if applicable) were **APPROVED** following *Expedited Review* Category (#7)\* by the Chairperson/designee for the Wayne State University Institutional Review Board (B3) for the period of 01/19/2012 through 01/18/2013. This approval does not replace any departmental or other approvals that may be required.

- Revised Protocol Summary Form (received in the IRB Office 01/17/2012)
- Protocol (received in the IRB Office 12/22/2011)
- Letter of Support from Oakland Livingston Human Service Agency (dated 11/29/2011)
- Pilot Phase Behavioral Research Informed Consent Form with Consent to be Contacted by Phone (dated 01/16/2012)
- Behavioral Research Informed Consent Form with Consent to be Contacted by Phone (dated 01/16/2012)
- Cover Letter to Mothers
- Flyer
- Data collection tools: Evaluation of Instruments, Caregiver Feeding Style Questionnaire, Parental Feeding Style Questionnaire, Demographic Data Sheet, Maternal Beliefs Questionnaire, Child Activity Questionnaire, and Child and Diet Evaluation Tool

- Federal regulations require that all research be reviewed at least annually. You may receive a "Continuation Renewal Reminder" approximately two months prior to the expiration date; however, it is the Principal Investigator's responsibility to obtain review and continued approval **before** the expiration date. Data collected during a period of lapsed approval is unapproved research and can never be reported or published as research data.
- All changes or amendments to the above-referenced protocol require review and approval by the IRB **BEFORE** implementation.
- Adverse Reactions/Unexpected Events (AR/UE) must be submitted on the appropriate form within the timeframe specified in the IRB Administration Office Policy (<http://www.irb.wayne.edu/policies-human-research.php>).

**NOTE:**

1. Upon notification of an impending regulatory site visit, hold notification, and/or external audit the IRB Administration Office must be contacted immediately.
2. Forms should be downloaded from the IRB website at each use.

\*Based on the Expedited Review List, revised November 1998

## APPEDIX B: INFORMED CONSENT PILOT PHASE

**Pilot Phase:** The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children

### Behavioral Research Informed Consent

Title of Study: The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children:

Principal Investigator (PI): Nicole Boucher  
College of Nursing  
248-787-2351

When we say “you” in this consent form, we mean you; “we” means the researchers and other staff.

### Purpose

Because you are the mother of a child enrolled at Head Start you are being asked to be in a research study of maternal beliefs and behaviors. You are being asked to help the research evaluate the questionnaires that will be used in the study. This study is being conducted at Oakland/Livingston County Head Start. The estimated number of study participants to be enrolled at Head Start is about 140. **Please read this form and ask any questions you may have before agreeing to be in the study.**

In this research study, we will be studying how a mother’s belief about her child’s weight impacts how the mother feeds her child. The study will assess how mothers concern about her child’s weight affects how she feeds the child. Also, the study will assess how the child’s physical activity level affects the child’s weight. The study will assess how sleep affects the child’s weight. The study will assess how screen time affects the child’s weight. Lastly, the study will assess how smoking, breastfeeding, and weight at time of pregnancy affects the child’s weight.

### Study Procedures

If you agree to take part in this research study, you will be asked to complete five study questionnaires and a food frequency questionnaire over a 24-hour period. The questionnaires ask questions about your beliefs and concerns about your child’s weight and how you feed your child. The questionnaires you will be asked to complete are:

1. A Maternal Beliefs Questionnaire that has 12 questions
2. A Demographic Data Sheet that has 26 questions.
3. A Child Activity Questionnaire that has 10 questions
4. A Parental Feeding Style Questionnaire with 27 questions.
5. A Caregiver Feeding Style Questionnaire with 19 questions
6. A Child and Diet Evaluation Tool that asks you to record all the food and drinks you serve your child in a 24-hour period.

You have the right not to answer any question that make your feel uncomfortable or you do not wish to answer. The total time to complete the questionnaire is 1½ hours and the food frequency questionnaire will take one day to complete. As part of the study you will be expected to

Submission/Revision Date: 1/16/12  
Protocol Version #: 1

Page 1 of 5

Participant’s Initials \_\_\_\_\_

HIC Date: 08-11

**Pilot Phase:** The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children

complete all the questionnaires at home and then return them to the primary investigator at Head Start. When you return the packet to the researcher at Head Start, she will ask you if you have any questions or concerns. To help the researcher evaluate the questionnaires you will be asked four additional open-ended questions about each questionnaires. These questions are:

1. Was any part of the questionnaire difficult to read, if so how?
2. Was any part of the questionnaire difficult to understand?
3. Was any part of questionnaire offensive?
4. How did you interpret the questions on the questionnaires?

After you return the packet the primary investigator will obtain your child's height and weight from the Head Start file.

I will allow the researcher to obtain my child's height and weight from the Head Start file.  
Child's name \_\_\_\_\_

To protect your identity the master list of names will be kept separate from the research packets. The master list will be stored in a locked file cabinet in a locked office and the primary investigator will have the only key. The informed consent that you sign will also be stored separately from the master list and the research packets and will be stored in a locked file cabinet in a locked office.

**Benefits**

As a participant in this research study, there *will* be no direct benefit for you; however, information from this study may benefit other people now or in the future.

**Risks**

By taking part in this study, you may experience the following risks: There is a slight risk of an emotional risk. You may become upset about your child's weight, how you are feeding your child, or about the foods you are feeding your child when answering the questions on the questionnaire. The researcher is a Certified Pediatric Nurse Practitioner who can talk to you and answer any questions you may have. Additionally, the primary investigator can help you find a pediatrician if you do not have one or help you contact your own pediatrician if you wish to answer additional questions. Additionally, there is a slight risk of breach of confidentiality. To minimize this risk your informed consent information will be stored in a locked file cabinet in a locked office. Additionally, the research packet you complete will be stored in locked file cabinet separate from the informed consents. The primary investigator will have the only keys to the cabinets and the office.

There may also be risks involved from taking part in this study that are not known to researchers at this time.

**Study Costs**

Participation in this study will be of no cost to you.

**Compensation**

Submission/Revision Date: 1/16/12  
Protocol Version #: 1

Page 2 of 5

Participant's Initials \_\_\_\_\_

HIC Date: 08-11



**Pilot Phase: The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children**

For taking part in this research study, you will be paid for your time and inconvenience. You will be provided with a \$15.00 Speedway gift card and be entered into a drawing to win one of two \$75.00 Speedway gift cards. You will receive the \$15.00 Speedway gift card when you return the research packet to the primary investigator at Head Start, and the drawing for the larger gift card will be at the completion of the study. The study will be completed when 140 people have participated

**Confidentiality**

All information collected about you during the course of this study will be kept confidential to the extent permitted by law. You will be identified in the research records by a code name or number. Information that identifies you personally will not be released without your written permission. However, the study sponsor, the Institutional Review Board (IRB) at Wayne State University, or federal agencies with appropriate regulatory oversight [e.g., Food and Drug Administration (FDA), Office for Human Research Protections (OHRP), Office of Civil Rights (OCR), etc.] may review your records.

When the results of this research are published or discussed in conferences, no information will be included that would reveal your identity.

**Voluntary Participation/Withdrawal**

Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you decide to take part in the study you can later change your mind and withdraw from the study. You are free to only answer questions that you want to answer. You are free to withdraw from participation in this study at any time. Your decisions will not change any present or future relationship with Wayne State University or its affiliates, or other services you are entitled to receive.

The PI may stop your participation in this study without your consent. The PI will make the decision and let you know if it is not possible for you to continue. The decision that is made is to protect your health and safety, or because you did not follow the instructions to take part in the study

**Questions**

If you have any questions about this study now or in the future, you may contact Nicole Boucher at the following phone number 248-787-2351. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call (313) 577-1628 to ask questions or voice concerns or complaints.

Submission/Revision Date: 1/16/12  
Protocol Version #: 1

Page 3 of 5

Participant's Initials \_\_\_\_\_

HIC Date: 08-11

**Pilot Phase: The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children**

**Consent to Participate in a Research Study**

To voluntarily agree to take part in this study, you must sign on the line below. If you choose to take part in this study you may withdraw at any time. You are not giving up any of your legal rights by signing this form. Your signature below indicates that you have read, or had read to you, this entire consent form, including the risks and benefits, and have had all of your questions answered. You will be given a copy of this consent form.

\_\_\_\_\_  
Signature of participant Date \_\_\_\_\_

\_\_\_\_\_  
Printed name of participant Time \_\_\_\_\_

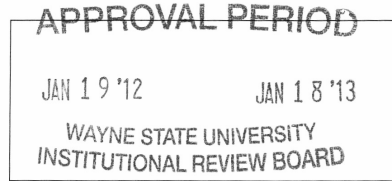
\_\_\_\_\_  
Signature of witness\*\* Date \_\_\_\_\_

\_\_\_\_\_  
Printed of witness\*\* Time \_\_\_\_\_

\_\_\_\_\_  
Signature of person obtaining consent Date \_\_\_\_\_

\_\_\_\_\_  
Printed name of person obtaining consent Time \_\_\_\_\_

\*\*Use when participant has had this consent form read to them (i.e., illiterate, legally blind, translated into foreign language).



Submission/Revision Date: 1/16/12  
Protocol Version #: 1

Page 4 of 5 \_\_\_\_\_  
Participant's Initials

HIC Date: 08-11



## APPENDIX C: INFORMED CONSENT

The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children

**Behavioral Research Informed Consent**

Title of Study: The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children

Principal Investigator (PI): Nicole Boucher  
College of Nursing  
248-787-2351

When we say “you” in this consent form, we mean you; “we” means the researchers and other staff.

**Purpose**

Because you are the mother of a child enrolled at Head Start you are being asked to be in a research study of maternal beliefs and behaviors. This study is being conducted at Oakland/Livingston County Head Start. The estimated number of study participants to be enrolled at Head Start is about 140. **Please read this form and ask any questions you may have before agreeing to be in the study.**

In this research study, we will be studying how a mother’s belief about her child’s weight impacts how the mother feeds her child. The study will assess how mothers concern about her child’s weight affects how she feeds the child. Also, the study will assess how the child’s physical activity level affects the child’s weight. The study will assess how sleep affects the child’s weight. The study will assess how screen time affects the child’s weight. Lastly, the study will assess how smoking, breastfeeding, and weight at time of pregnancy affects the child’s weight.

**Study Procedures**

If you agree to take part in this research study, you will be asked to complete five study questionnaires and a food frequency questionnaire over a 24-hour period. The questionnaires ask questions about your beliefs and concerns about your child’s weight and how you feed your child. The questionnaires you will be asked to complete are:

1. A Maternal Beliefs Questionnaire that has 12 questions
2. A Demographic Data Sheet that has 26 questions.
3. A Child Activity Questionnaire that has 10 questions
4. A Parental Feeding Style Questionnaire with 27 questions.
5. A Caregiver Feeding Style Questionnaire with 19 questions
6. A Child and Diet Evaluation Tool that asks you to record all the food and drinks you serve your child in a 24-hour period.

You have the right not to answer any question that make you feel uncomfortable or you do not wish to answer. The total time to complete the questionnaire is 1½ hours and the food frequency questionnaire will take one day to complete. As part of the study you will be expected to complete all the questionnaires at home and then return them to the primary investigator at Head Start. When you return the packet to the researcher at Head Start, she will ask you if you have any

Submission/Revision Date: 1/16/12  
Protocol Version #: 1

Page 1 of 5

Participant’s Initials \_\_\_\_\_

HIC Date: 08-11

### The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children

questions or concerns. You will be asked four additional open-ended questions. These questions are:

1. Was any part of the questionnaire difficult to read, if so how?
2. Was any part of the questionnaire difficult to understand?
3. Was any part of questionnaire offensive?
4. How did you interpret the questions on the questionnaires?

After you return the packet the primary investigator will obtain your child's height and weight from the Head Start file.

I will allow the researcher to obtain my child's height and weight from the Head Start file.

Child's name \_\_\_\_\_

To protect your identity the master list of names will be kept separate from the research packets. The master list will be stored in a locked file cabinet in a locked office and the primary investigator will have the only key. The informed consent that you sign will also be stored separately from the master list and the research packets and will be stored in a locked file cabinet in a locked office.

#### Benefits

As a participant in this research study, there *will* be no direct benefit for you; however, information from this study may benefit other people now or in the future.

#### Risks

By taking part in this study, you may experience the following risks: There is a slight risk of an emotional risk. You may become upset about your child's weight, how you are feeding your child, or about the foods you are feeding your child when answering the questions on the questionnaire. The researcher is a Certified Pediatric Nurse Practitioner who can talk to you and answer any questions you may have. Additionally, the primary investigator can help you find a pediatrician if you do not have one or help you contact your own pediatrician if you wish to answer additional questions. Additionally, there is a slight risk of breach of confidentiality. To minimize this risk your informed consent information will be stored in a locked file cabinet in a locked office. Additionally, the research packet you complete will be stored in locked file cabinet separate from the informed consents. The primary investigator will have the only keys to the cabinets and the office.

There may also be risks involved from taking part in this study that are not known to researchers at this time.

#### Study Costs

Participation in this study will be of no cost to you.

#### Compensation

For taking part in this research study, you will be paid for your time and inconvenience. You will be provided with a \$15.00 Speedway gift card and be entered into a drawing to win one of two \$75.00

Submission/Revision Date: 1/16/12

Page 2 of 5

Protocol Version #: 1

Participant's Initials \_\_\_\_\_

HIC Date: 08-11

The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children

Speedway gift cards. You will receive the \$15.00 Speedway gift card when you return the research packet to the primary investigator at Head Start, and the drawing for the larger gift card will be at the completion of the study. The study will be completed when 140 people have participated

#### **Confidentiality**

All information collected about you during the course of this study will be kept confidential to the extent permitted by law. You will be identified in the research records by a code name or number. Information that identifies you personally will not be released without your written permission. However, the study sponsor, the Institutional Review Board (IRB) at Wayne State University, or federal agencies with appropriate regulatory oversight [e.g., Food and Drug Administration (FDA), Office for Human Research Protections (OHRP), Office of Civil Rights (OCR), etc.] may review your records.

When the results of this research are published or discussed in conferences, no information will be included that would reveal your identity.

#### **Voluntary Participation/Withdrawal**

Taking part in this study is voluntary. You have the right to choose not to take part in this study. If you decide to take part in the study you can later change your mind and withdraw from the study. You are free to only answer questions that you want to answer. You are free to withdraw from participation in this study at any time. Your decisions will not change any present or future relationship with Wayne State University or its affiliates, or other services you are entitled to receive.

The PI may stop your participation in this study without your consent. The PI will make the decision and let you know if it is not possible for you to continue. The decision that is made is to protect your health and safety, or because you did not follow the instructions to take part in the study

#### **Questions**

If you have any questions about this study now or in the future, you may contact Nicole Boucher at the following phone number 248-787-2351. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call (313) 577-1628 to ask questions or voice concerns or complaints.

Submission/Revision Date: 1/16/12  
Protocol Version #: 1

Page 3 of 5  
Participant's Initials \_\_\_\_\_

HIC Date: 08-11

The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children

**Consent to Participate in a Research Study**

To voluntarily agree to take part in this study, you must sign on the line below. If you choose to take part in this study you may withdraw at any time. You are not giving up any of your legal rights by signing this form. Your signature below indicates that you have read, or had read to you, this entire consent form, including the risks and benefits, and have had all of your questions answered. You will be given a copy of this consent form.

\_\_\_\_\_  
Signature of participant Date \_\_\_\_\_

\_\_\_\_\_  
Printed name of participant Time \_\_\_\_\_

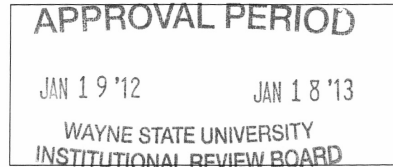
\_\_\_\_\_  
Signature of witness\*\* Date \_\_\_\_\_

\_\_\_\_\_  
Printed of witness\*\* Time \_\_\_\_\_

\_\_\_\_\_  
Signature of person obtaining consent Date \_\_\_\_\_

\_\_\_\_\_  
Printed name of person obtaining consent Time \_\_\_\_\_

\*\*Use when participant has had this consent form read to them (i.e., illiterate, legally blind, translated into foreign language).



**Consent to be contacted by Phone**

Submission/Revision Date: 1/16/12  
Protocol Version #: 1

Page 4 of 5  
Participant's Initials \_\_\_\_\_

HIC Date: 08-11

The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children

May I contact you at your home phone number or your cell phone number if I have questions about the questionnaires you completed?

Yes          No

Phone number you would like to be contacted at \_\_\_\_\_  
If you agree to be contacted by phone, please sign below. You may change your mind at any point.

\_\_\_\_\_  
Signature of participant          Date \_\_\_\_\_

\_\_\_\_\_  
Printed name of participant          Time \_\_\_\_\_

\_\_\_\_\_  
Signature of witness\*\*          Date \_\_\_\_\_

\_\_\_\_\_  
Printed of witness\*\*          Time \_\_\_\_\_

\_\_\_\_\_  
Signature of person obtaining consent          Date \_\_\_\_\_

\_\_\_\_\_  
Printed name of person obtaining consent          Time \_\_\_\_\_

**APPROVAL PERIOD**

JAN 19 '12          JAN 18 '13

**WAYNE STATE UNIVERSITY  
INSTITUTIONAL REVIEW BOARD**

Submission/Revision Date: 1/16/12  
Protocol Version #: 1

Page 5 of 5  
Participant's Initials \_\_\_\_\_

HIC Date: 08-11



## APPENDIX D: LETTER TO MOTHER

Dear Mother,

Welcome to the study! You were asked to participate in this study, because you are the mother of a child enrolled in Head Start. I know we have met, but again, my name is Nicole. I would like to thank you for agreeing to participate in this study. I will be your contact person for the entire study. First, I want to let you know again that your participation in the study is strictly voluntary. If you have any questions about the study I will be at Head Start to answer them. I will be at Head Start all day Mondays, Tuesday morning, Wednesday morning until March 16, 2012. Starting March 19<sup>th</sup> I will be at Head Start Tuesday morning, Wednesday morning, and all day Thursday. You can also contact me at 248-787-2351 for any questions or concerns.

Please answer the questions in this packet. You have the right to not answer any question that makes you uncomfortable or that you wish not to answer. Also, for one day please record all the food you serve your child on the first sheet titled at the top "Child and Diet Evaluation Tool." Once you have completed the packet, please return it to me at the Head Start building.

Thank you,

Nicole Boucher

APPROVAL PERIOD

JAN 19 '12

JAN 18 '13

WAYNE STATE UNIVERSITY  
INSTITUTIONAL REVIEW BOARD

## APPENDIX E: STUDY FLYER

**VOLUNTEERS NEEDED**

The Effect of Maternal Beliefs and Behavior on the Body Weight Status of Preschool-Aged Children

<b>WHO:</b>	Only Mothers of children enrolled at Head Start Between the ages of 18 to 45
<b>WHAT:</b>	Participate in a Wayne State University nursing research study about <b>maternal beliefs about a child's weight and maternal feeding styles</b>
<b>WHY:</b>	To develop an understanding of mothers beliefs about a child's weight and an understanding of maternal feeding styles
<b>HOW:</b>	This study involves a filling out several questionnaires at home and then meeting with the PI for 5 to 10 minutes to at Head Start to answer any of your questions and review the informed consent.
<b>COST:</b>	<b>There Is No Cost Or Obligation To You</b>
<b>BENEFIT:</b>	As a participant in this research study, there may be no direct benefit for you; however, information from this study may benefit other people now or in the future.
<b>COMPENSATION:</b>	Each participant will receive a <b>Speedway Gift Card</b> and will be entered into a drawing to win one of two larger speedway gift cards.

***Interested???***

***Nicole Boucher (the researcher) will be at Head Start if you would like to participate***

APPROVAL PERIOD

JAN 19 '12

JAN 18 '13

WAYNE STATE UNIVERSITY

## APPENDIX F: MATERNAL BELIEFS SURVEY

Please answer the following questions about your beliefs about your child's needs by circling the appropriate box.

		One	Two	Three	Four	Five plus
1.	How many servings of fruit do you believe your child needs each day?	1	2	3	4	5
2.	How many servings of vegetables do you believe your child needs each day?	1	2	3	4	5
3.	How many servings of protein do you believe your child needs each day?	1	2	3	4	5
4.	How many servings of whole grains do you believe your child needs each day?	1	2	3	4	5
5.	How many servings of milk and dairy products do you believe your child needs each day?	1	2	3	4	5
6.	How many servings of sweetened drinks (soda pop, Kool-Aid) do you believe your child needs each day?	1	2	3	4	5
7.	How many servings of fat do you believe your child needs each day?	1	2	3	4	5
8.	How many servings of juice do you believe your child needs each day?	1	2	3	4	5
9.	How many servings of sweets do you believe your child needs each day?	1	2	3	4	5

		Underweight	Slightly underweight	Just the right weight	Overweight	Very Overweight
10.	I believe my child is...	1	2	3	4	5

		Strongly disagree	Disagree	Neither disagree or agree	Agree	Strongly Agree
11.	I am currently concerned about my child's weight,	1	2	3	4	5

		Underweight	Slightly underweight	Overweight	Very overweight
12.	If you are concerned about your child's weight, are you concerned your child is....	1	2	3	4

13.	I believe my child is a...	1	2	3	4	5
		Very picky eater	Slightly picky eater	Neither a picky nor good eater	A fairly good eater	A very good eater

## APPENDIX G: CHILD ACTIVITY SURVEY

Please answer the questions below about your child.

1. How much time does your child spend watching Television? \_\_\_\_\_
2. How much time does your child spend playing video games? \_\_\_\_\_
3. How much time does your child spend on a computer each day? \_\_\_\_\_
4. How much time does your child spend playing games on Nintendo, iPod, or other hand held devices each day? \_\_\_\_\_
5. How much time does your child spend playing games or watching videos on your cell phone or another persons cell phone each day? \_\_\_\_\_
6. How long does your child sleep at night? \_\_\_\_\_
7. Does your child take a nap? Yes \_\_\_\_\_ No \_\_\_\_\_
8. If your child takes a nap, how long does your child sleep? \_\_\_\_\_
9. If your child takes a nap, how many days of the week do they take a nap? \_\_\_\_\_
10. About how many days per week does your child participate in greater than 60 minutes of active physical exercise or play (such as running, biking, climbing, or active playing such as tag)?
  - \_\_\_ 1-2 days each week or less
  - \_\_\_ 3-5 days each week
  - \_\_\_ 6-7 days each week

## APPENDIX H: PARENTAL FEEDING STYLE QUESTIONNAIRE

Please circle your answer to each question below

		Never	Rarely	Sometimes	Often	Always
1.	I allow my child to choose which foods to have for meals.	1	2	3	4	5
2.	I give my child something to eat to make him/her feel better when s/he is feeling upset	1	2	3	4	5
3.	I encourage my child to look forward to the mea	1	2	3	4	5
4.	I encourage my child to look forward to the meal I praise my child if s/he eats what I give him/her	1	2	3	4	5
5.	I decide how many snacks my child should have.	1	2	3	4	5
6.	I encourage my child to eat a wide variety of foods.	1	2	3	4	5
7.	In order to get my child to behave him/herself I promise him/her something to eat.	1	2	3	4	5
8.	I present food in an attractive way to my child	1	2	3	4	5
9.	If my child misbehaves I withhold his/her favorite food.	1	2	3	4	5
10.	I encourage my child to taste each of the foods I serve at mealtimes.	1	2	3	4	5
11.	I allow my child to wander around during a meal.	1	2	3	4	5
12.	I encourage my child to try foods that s/he hasn't tasted before.	1	2	3	4	5
13.	I give my child something to eat to make him/her feel better when s/he has been hurt.	1	2	3	4	5
14.	I let my child decide when s/he would like to have her meal.	1	2	3	4	5
15.	I give my child something to eat if s/he is feeling bored.	1	2	3	4	5
16.	I allow my child to decide when s/he has had enough snacks to eat.	1	2	3	4	5
17.	I decide when it is time for my child to have a snack.	1	2	3	4	5
18.	I use puddings as a bribe to get my child to eat his/her main course.	1	2	3	4	5
19.	I encourage my child to enjoy his/her food.	1	2	3	4	5
20.	I decide the times when my child eats his/her meals.	1	2	3	4	5

21.	I give my child something to eat to make him/her feel better when s/he is worried.	1	2	3	4	5
22.	I reward my child with something to eat when s/he is well behaved.	1	2	3	4	5
23.	I let my child eat between meals whenever s/he wants.	1	2	3	4	5
24.	I insist my child eats meals at the table.	1	2	3	4	5
25.	I give my child something to eat to make him/her feel better when s/he is feeling angry.	1	2	3	4	5
26.	I decide what my child eats between meals.	1	2	3	4	5
27.	I praise my child if s/he eats a new food	1	2	3	4	5

## APPENDIX I: CAREGIVER FEEDING STYLE QUESTIONNAIRE

Please circle how often you...

		Never	Rarely	Sometimes	Most of a time	Always
1.	Physically struggle with the child to get him or her to eat (for example, physically putting the child in the chair so he or she will eat).	1	2	3	4	5
2.	Promise the child something other than food if he or she eats (for example, "If you eat your beans, we can play ball after dinner").	1	2	3	4	5
3.	Encourage the child to eat by arranging the food to make it more interesting (for example, making smiley faces on the pancakes).	1	2	3	4	5
4.	Ask the child questions about the food during dinner.	1	2	3	4	5
5.	Tell the child to eat at least a little bit of food on his or her plate.	1	2	3	4	5
6.	Reason with the child to get him or her to eat (for example, "Milk is good for your health because it will make you strong").	1	2	3	4	5
7.	Say something to show your disapproval of the child for not eating dinner.	1	2	3	4	5
8.	Allow the child to choose the foods he or she wants to eat for dinner from foods already prepared.	1	2	3	4	5
9.	Compliment the child for eating food (for example, "What a good boy! You're eating your beans").	1	2	3	4	5
10.	Suggest to the child that he or she eats dinner, for example by saying, "Your dinner is getting cold"	1	2	3	4	5
11.	Say to the child "Hurry up and eat your food"	1	2	3	4	5
12.	Warn the child that you will take away something other than food if he or she doesn't eat (for example, "If you don't finish your meat, there will be no play time after dinner").	1	2	3	4	5



13.	Tell the child to eat something on the plate (for example, "Eat your beans").	1	2	3	4	5
14.	Warn the child that you will take a food away if the child doesn't eat (for example, "If you don't finish your vegetables, you won't get fruit").	1	2	3	4	5
15.	Say something positive about the food the child is eating during dinner.	1	2	3	4	5
16.	Spoon-feed the child to get him or her to eat dinner.	1	2	3	4	5
17.	Help the child to eat dinner (for example, cutting the food into smaller pieces).	1	2	3	4	5
18.	Encourage the child to eat something by using food as a reward (for example, "If you finish your vegetables, you will get some fruit").	1	2	3	4	5
19.	Beg the child to eat dinner.	1	2	3	4	5

## APPENDIX J: CHILD AND DIET EVALUATION TOOL

Please check the box in the food group every time you serve your child a food during the day. If you have a question about which group the food belongs to, please check the appendix on the pages following this one.

Day of the week you completed the Child and Diet Evaluation Tool \_\_\_\_\_

	Breakfast	Snack	Lunch	Snack	Dinner	Snack	Snack
<b>CEREALS</b>							
<b>SANDWICH, BREADS, CAKES, BISCUITS</b>							
<b>SPREADS, SAUCES, SOUPS</b>							
<b>CHEESE, EGGS</b>							
<b>CHICKEN, TURKEY</b>							
<b>OTHER MEATS</b>							
<b>FISH</b>							
<b>VEGETARIAN</b>							
<b>PIZZA, PASTA, RICE ETC</b>							
<b>DESSERTS, PUDDINGS</b>							
<b>SWEETS, CRISPS</b>							
<b>VEGETABLES &amp; BEANS</b>							
<b>POTATO</b>							
<b>FRUIT</b>							
<b>DRINKS (Please Mark M for Milk)</b>							

**A. CEREALS**

1. Sugar-coated e.g. Frosties, Sugar Puffs, Frosted Flakes, Capt. Crunch
2. Hi-fiber e.g. Bran flakes, Weetabix, Shreddies, Muesli, Shredded Wheat, Shredded Mini Wheats
3. Other e.g. Cornflakes, Rice Krispies etc
4. Milk on cereal
5. Porridge, Ready Brek, Grits, Oatmeal

**B. SANDWICH, BREADS**

1. Sandwich (check filling separately), bread, roll, toast, crumpet etc
2. Croissant, sweet waffles, pop tarts
3. Garlic bread, naan
4. Chapatti, pita bread etc
5. Cracker, crispbread etc
6. Cake, bun, sponge pudding
7. Sweet pies, tarts, crumbles
8. Cereal bar, muesli bar, flapjack
9. Chocolate biscuit
10. Other biscuit

**C. SPREADS, SAUCES, SOUPS**

1. Margarine, butter
2. Tomato ketchup, brown sauce
3. Mayonnaise, salad cream
4. Sweet spread e.g. jam, honey
5. Savoury spread e.g. marmite, pate
6. Gravy
7. Soup

**D. CHEESE, EGGS**

1. Hard cheese, e.g. cheddar, red Leicester, Colby
2. Cheese spread, triangle, string, American slices
3. Cottage cheese
4. Quiche – meat, fish or vegetable
5. Scrambled egg, omelets, fried egg
6. Poached, boiled egg

**E. CHICKEN, TURKEY**

1. Sliced
2. Nuggets, dippers, kiev etc
3. In a creamy sauce, curry

**F. OTHER MEATS e.g.**

1. Sliced. Roast, steak, chops

2. Stew, casserole, mince, curry
3. Beef burger, hamburger
4. Bacon
5. Ham
6. Sausages
7. Sausage rolls, meat pie, pasty
8. Corned beef, luncheon meats, salami, pepperoni
9. Offal, e.g. liver, kidney

#### **G. FISH**

1. Fish fingers, Fish Sticks
2. Fried fish in batter (as in fish & chips)
3. White fish (not fried) e.g. cod, haddock, plaice
4. Tuna or other oily fish e.g. salmon (including canned and fresh)
5. Shellfish e.g. prawns, mussels, shrimp

#### **H. VEGETARIAN**

1. Vegetable pie, pasty
2. Samosa, pakora, bhajee
3. Quorn, veggie mince, sausages etc

#### **I. PIZZA, PASTA, RICE ETC**

1. Pizza
2. Boiled rice
3. Fried rice
4. Noodles
5. Pasta - plain
6. Pasta with tomato sauce (no meat)
7. Pasta with cheese sauce
8. Pasta with meat, fish (and sauce)

#### **J. DESSERTS, PUDDINGS ETC**

1. Yoghurt, go-gurt, yogurt, Dannables
2. Jelly, ice lolly
3. Ice cream, frozen dessert, popsicle

#### **K. SWEETS, CRISPS ETC**

1. Sweets, toffees mints
2. Chocolate bar, e. g. Mars, Galaxy, Milky Way, Nestle Crunch
3. Crisps, savoury snacks (e.g. Cheddars) Popcorn, Chips
4. Nuts

**L. VEGETABLES & BEANS**

1. Cucumber
2. Tomatoes
3. Celery
4. Coleslaw
5. Other salad vegetable e.g. lettuce
6. Stir-fried vegetables
7. Broccoli, brussel sprouts, cabbage
8. Carrots
9. Cauliflower
10. Peas, sweet corn
11. Mixed vegetables
12. Celeriac/swede
13. Peppers, red, green yellow etc
14. Other vegetable
15. Baked beans
16. Lentils, Dahl
17. Other beans, pulses
18. Seeds, e.g. sunflower, sesame

**M. POTATO**

1. Boiled, mashed, jacket
2. Chips, roast, potato faces etc

**N. FRUIT**

1. Apple
2. Pear
3. Banana
4. Orange, satsuma etc
5. Grapes
6. Melon
7. Pineapple
8. Strawberry, raspberry etc
9. Peach, nectarine, plum, apricot, mango
10. Kiwi
11. Fruit salad (canned or fresh)
12. Other fruit
13. Dried fruit

**O. Nothing to Eat****P. DRINKS**

1. Milk, milky drink
2. Tea, coffee
3. Drinking chocolate etc
4. Fizzy drink (pop), squash, fruit drink (e.g. Ribena)
5. Diet, low calorie drink (including fizzy low calorie)
6. Fruit juice (pure)
7. Water

**These questions provide us with more detail about the amounts and types of food and drink usually eaten by  
Please circle the closest answer.**

1. How much milk in total does your child usually have on an average day e.g. on cereal and drinks? (One average child's milk carton = 1 cup).
  - a. None
  - b. 1/4 cup
  - c. 1/2 cup
  - d. 3/4 cup
  - e. One cup
  - f. More than one cup
2. What type of milk does your child usually have? (Check all that apply)
  - a. Whole milk
  - b. 2% milk
  - c. 1% milk
  - d. Skim milk
  - e. Lactose free milk
  - f. Other
3. What type of bread/roll/toast does your child usually eat? (Check all that apply)
  - a. None
  - b. White
  - c. White with added fiber
  - d. Whole grain
  - e. Other

4. What type of fat spread does your child usually eat? (Check all that apply)
- Butter e.g. Anchor, Lurk
  - Butter-type spread e.g. Utterly Butterfly, Golden Churn, Clover, I Cannot Believe its Not Butter
  - Soft Margarine e.g. Stork Polyunsaturated e.g. Flora, Bannerol, Vitality
  - Olive spread e.g. Olivia, Asda
  - Olive Gold
  - Low-fat spread e.g. Flora Light, Asda
  - Olive Gold Light
  - Does not have spread
5. How much pure fruit juice in total does your child usually drink on an average day? (One average milk carton=1 cup)
- None
  - 1/4 cup
  - 1/2 cup
  - 3/4 cup
  - One cup
  - More than 1 cup
6. How many servings of fruit in total (fruit eaten at home and school) does your child usually have on an average day? (A serving of fruit is classed as a whole fruit e.g. an apple, a banana)
- None
  - 1/4
  - 1/2
  - One
  - Two
  - Three
  - Four
  - Five
  - Six



7. How many servings of vegetables and salad in total (vegetables eaten at home and school) does your child usually have on an average day? A serving of vegetables or salad is classed as a heaped serving spoon, or whole vegetable. Potatoes are not included.
- None
  - One
  - Two
  - Three
  - Four
  - Five
8. When your child eats fruit, how much of the whole fruit e.g. apple, banana, and orange is usually eaten?
- A bite
  - 1/4
  - 1/2
  - 3/4
  - Whole thing (excluding skin, pips etc)
9. How much sugar in total does your child usually have added to food or drink on an average day? (3teaspoons = 1 table spoon)
- None
  - 1-2 teaspoons
  - 3-4 teaspoons
  - 5-6 teaspoons
  - 7 + teaspoons
10. Where did your child eat today? (Circle all places)
- Home
  - School
  - Friend/relative
  - Childcare
  - Other

## APPENDIX K: DEMOGRAPHIC DATA SHEET

**Please answer the questions below. You have the right to not answer any question you feel uncomfortable answering or you wish not to answer. Please answer the questions for the child enrolled in the study with you. There are a total of 29 questions.**

1. Today's date: \_\_\_\_/\_\_\_\_/\_\_\_\_

2. Child's birth month and year: \_\_\_\_/\_\_\_\_

3. Child's sex:

\_\_\_\_ Male  
\_\_\_\_ Female

4. What is your relationship with child?

\_\_\_\_ Mother  
\_\_\_\_ Legal guardian- mother  
Your birth month and year \_\_\_\_/\_\_\_\_

5. What is your highest grade completed?

Circle one

Elementary School	Middle School	High School	College
1 2 3 4 5	6 7 8	9 10 11 12 (GED)	13 14 15 16 17

6. Does your child have any medical condition that limits his/her physical activity?

\_\_\_\_ No  
\_\_\_\_ Yes (what \_\_\_\_\_)

7. Your race:

\_\_\_\_ Asian/ Pacific Islander  
\_\_\_\_ Black/African-American  
\_\_\_\_ Hispanic  
\_\_\_\_ White  
\_\_\_\_ American Indian  
\_\_\_\_ Other (describe \_\_\_\_\_)

7A. Your Ethnicity

\_\_\_\_ Asian/ Pacific Islander  
\_\_\_\_ Black/African-American  
\_\_\_\_ Hispanic  
\_\_\_\_ White  
\_\_\_\_ American Indian  
\_\_\_\_ Other (describe \_\_\_\_\_)

8. Your child's race/ethnicity:

- Asian/ Pacific Islander  
 Black/African-American  
 Hispanic  
 White  
 American Indian  
 Other (describe \_\_\_\_\_)

9. Child's birth weight \_\_\_\_\_

10. *Just before* you got pregnant with your child how much did you weight?  
 \_\_\_\_\_ Pounds

11. How tall are you without shoes? \_\_\_\_\_ Feet \_\_\_\_\_ inches

12. Did you ever breastfeed or pump breast milk to feed to your child when the child was a newborn even for a short period of time?

- Yes  
 No

13. If yes, how many weeks or months did you exclusively breastfed or pump milk for you baby?

- Weeks  
 Months

14. In the three months before you got pregnant with this child, how many cigarettes did you smoke on an average day? (A pack has 20 cigarettes)

- 41 cigarettes or more  
 21 to 40 cigarettes  
 11 to 20 cigarettes  
 6 to 10 cigarettes  
 1 to 5 cigarettes  
 Less than one cigarette  
 I did not smoke then

15. In the last three months of your pregnancy with this child how many cigarettes did you smoke per day? (A pack has 20 cigarettes)

- 41 cigarettes or more  
 21 to 40 cigarettes  
 11 to 20 cigarettes  
 6 to 10 cigarettes  
 1 to 5 cigarettes  
 Less than one cigarette  
 I did not smoke then

16. How many cigarettes do you smoke on average day *now*? (A pack has 20 cigarettes)

- 41 cigarettes or more  
 21 to 40 cigarettes  
 11 to 20 cigarettes  
 6 to 10 cigarettes  
 1 to 5 cigarettes  
 Less than one cigarette  
 I did not smoke then

17. If you did smoke, before, during or after your pregnancy, how long did you smoke?

- Less than one month  
 One month or more

18. Did anyone in your household smoke before, during or after pregnancy?

- Yes  
 No

19. Who lives in your household?

Other children and their ages? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Child's father or a significant other? \_\_\_\_\_

Extended family (grandparents, aunts, cousins)? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

20. If you do not live with the child's father, how much time does the child spend with their father? \_\_\_\_\_

21. How far do you live from the nearest major grocery store such as Kroger, Alde's, or Busch's?

- Less than one mile  
 One mile to five miles  
 Six to ten miles  
 Ten to fifteen miles  
 Greater than fifteen miles

22. Where do you do most of your grocery shopping?

\_\_\_\_\_

23. Does the store where you do the majority of your grocery shopping have a variety of fresh fruits and vegetables?

- Yes  
 No

24. How far do you live from your local WIC office?

- Less than one mile  
 One mile to five miles  
 Six to ten miles  
 Ten to fifteen miles  
 Greater than fifteen miles

25. What forms of transportation do you have available to you? Please circle all that you have available to you.

- Own a car  
 Borrow a car  
 Bus system  
 Friends or family who drives you places  
 Other \_\_\_\_\_

26. Have you heard of the “my food plate”?

- Yes  
 No

27. If you have heard of the “my food plate” are you using it as a nutritional guide with your child?

- Yes  
 No

28. Does you have obesity related type II Diabetes?

- Yes  
 No

29. Who does the majority of the grocery shopping in your household? \_\_\_\_\_

30. Who prepares the majority of the meals in your household? \_\_\_\_\_

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Zimmerman, F., & Bell, J. (2010). Associations of television content type and obesity in children. *American Journal of Public Health*, 100(2), 334-340. doi: 10.2105/AJPH.2008.155119.

**ABSTRACT****THE EFFECT OF MATERNAL BELIEFS AND BEHAVIOR ON THE BODY WEIGHT STATUS OF PRESCHOOL-AGED CHILDREN**

by

**NICOLE BOUCHER****May 2013****Advisor:** Dr. Rosalind Peters**Major:** Nursing**Degree:** Doctor of Philosophy

Early onset pediatric obesity has become a major health concern in the United States. Pediatric obesity can lead to childhood hypertension, type II diabetes, and orthopedic problems. Currently, in the United States one in seven low-income preschools are overweight or obese. One of the key contributing factors to early onset childhood obesity is how children are socialized to the eating and mealtime environment. Maternal feeding styles play an integral role in how children are socialized to the eating and mealtime environment.

The purpose of the this study was to determine the extent to which maternal beliefs and behavior regarding the child's body weight status influenced the child's actual weight beyond the known risk factors for childhood obesity. To test the central hypothesis of the study four specific aims were pursued.

Guided by the theory of dependent-care the study utilized a descriptive correlational research design. The sample was 126 mother/child dyads recruited from a southeastern Michigan Head Start program. Each mother completed a research packet that contained a demographic data sheet, a maternal beliefs survey, a child activity

survey, the Parental Feeding Style Questionnaire, the Caregiver Feeding Style, and the Child and Diet Evaluation Tool. A total of 170 packets were distributed and a total of 130 packets were returned for a response rate of 75%. Four packets were eliminated from data analysis due to missing data leaving a total of 126 packets included in data analysis.

Overall, results indicated that maternal beliefs such as nutritional belief and belief about the child's eating style were significantly associated with maternal feeding style. The maternal behavior of the authoritative feeding style was significantly associated with the child's health. The results provided support for the theoretical linkage between the dependent-care agency and dependent-care behaviors.

Overall, the study provides a description of maternal beliefs and behaviors related to the body weight status of a preschool-aged child. The study provides new information about the Caregiver Feeding Style Questionnaire and the Parental Feeding Style Questionnaire. Lastly, the study provides a some support for the theory of dependent-care and theoretical linkages that can be utilized in future studies.

**AUTOBIOGRAPHICAL STATEMENT**

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