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# Differences in the development of underweight and overweight children and their parents' perceptions of their socioemotional development.

William Roy Henninger  
*Iowa State University*

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Differences in the development of underweight and overweight children and their  
parents' perceptions of their socioemotional development.

by

William Roy Henninger IV

A thesis submitted to the graduate faculty  
in partial fulfillment of the requirements for the degree of  
MASTER OF SCIENCE

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Program of Study Committee:  
Gayle L. Luze, Major Professor  
Carla Peterson  
Mack Shelley

Iowa State University

Ames, Iowa

2008

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## CHAPTER 1. INTRODUCTION

### Introduction

Existing research demonstrates that overweight during early childhood has become a major concern in the United States (Center for Disease Control and Prevention, 2008). In the past 30 years the number of children diagnosed as overweight has almost doubled (CDC). The increase in the occurrence of overweight has occurred across races, socioeconomic class, and age groups (CDC). Multiple studies have identified mental, physical, social, and emotional deficits related to overweight in childhood and adolescence (e.g., CDC; Datar, Strum, Magnabosco, 2004; Dietz, 1998; Israel & Ivanova, 2002; Must & Strauss, 1999; Mustillo et al., 2003; Yanovski, 2001).

Research on underweight in the U.S. is less extensive. A major reason is the low prevalence of underweight in the U.S. (estimated at 2%, United Nations International Children's Emergency Fund, 2006). However, research on underweight worldwide has demonstrated that a significant number of children (estimated at 25% Chang, Walker, Grantham-McGregor, & Powell, 2002) are underweight. As with overweight, underweight in childhood has been linked to mental, physical, social, and emotional deficits (Chang et al.; Mendez & Adair, 1999; Walker, Chang, & Powell, 2001; Whaley, Sigman, Espinosa, 1998).

The purpose of this thesis is to expand the current research and literature pertaining to the socioemotional development of children who are underweight and overweight during their early childhood years. This thesis will review existing research on the effects of socioemotional development of underweight and overweight in early childhood. In addition, comparisons between parental ratings of socioemotional

development will be compared for overweight, underweight, and typically weighted children utilizing the Early Head Start data set.

### Thesis Organization

William Henninger is a graduate student and the primary researcher and author for this thesis. Dr. Gayle Luze is an associate professor and is the supervising major professor for this thesis. The first chapter of this thesis serves as a general introduction to the issues of overweight and underweight in early childhood. The second chapter is an extensive review of the literature pertaining to the development of underweight and overweight children. The third chapter is a research report that utilizes a preexisting data set analyzed to ascertain the difference in parental ratings of socioemotional development between overweight, underweight, and typically weighted children. Finally, the fourth chapter serves as a general conclusion that ties together information from all the chapters and suggestions for future research.

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## **CHAPTER 2. LITERATURE REVIEW OF DIFFERENCES IN DEVELOPMENT BETWEEN OVERWEIGHT AND UNDERWEIGHT CHILDREN**

William Henninger and Gayle Luze

### Introduction

The landscape of early childhood health has changed drastically in the last 20 to 30 years. A recent Center for Disease Control and Prevention (CDC) report estimates that 13.9% of American children aged 2-5 years old are considered overweight (CDC, 2008). In addition, the United Nations International Children's Emergency Fund (UNICEF) has reported that approximately 2% of U.S. children fall into the category of underweight (UNICEF, 2006). However, the prevalence of underweight in childhood worldwide has been estimated as high as 25% (Change, Walker, Grantham-McGregor, & Powell, 2002). This research signifies an alarming trend in the increase of unhealthy weight in children (CDC).

Research suggests that both underweight and overweight in early childhood can result in numerous detrimental physical, cognitive, and social and emotional outcomes (CDC, 2008; Datar, Strum, & Magnabosco, 2004; Dietz, 1998; Israel & Ivanova, 2002; Must & Strauss, 1999; Mustillo et al., 2003; Yanovski, 2001). In addition, researchers suggest that parents' perceptions of their child's weight can influence their child's self-image (Levinson et al., 1986). Studies propose parents of overweight children are likely to estimate their children are less overweight than they actually are, and parents of underweight children tend to assume their children's weights are healthier than is actually

so (Akerman, Williams, & Meunier, 2007; Wald et al., 2007). This literature review will look at the existing research on the effects of underweight and overweight in childhood.

## Literature Review

### *BMI*

Body Mass Index (BMI) is calculated by dividing a child's height by his/her weight squared, then multiplying by 703, (e.g.,  $[\text{weight (lbs)}]/[\text{height (in)}]^2 \times 703$ ) (CDC, 2008). Children who are at risk for overweight are defined as having a BMI at or above the 85<sup>th</sup> percentile up to the 94<sup>th</sup> percentile (CDC). In addition, a child deemed overweight is a child who has a BMI 95<sup>th</sup> percentile and higher (CDC). Children considered underweight are those who fall into the 5<sup>th</sup> percentile or lower for their age (CDC). Percentile rank is a way to gauge where an individual's weight and height places them in conjunction with a reference group based on the measure in question. Specifically for BMI, if a child places in the 50<sup>th</sup> percentile, their BMI would be greater than 50% of representative group on which the percentile rankings are based. The Center for Disease Control (CDC) BMI percentile rankings are based on research conducted in 2000 by the CDC, which utilized a nationally representative sample of youth (CDC).

### *Childhood Obesity*

*Ethnic and Class Disparities.* In the past two decades the United States has seen a large increase in the prevalence of obesity among children. Children between the ages of 2 and 5 years diagnosed as "at risk for overweight" and "overweight" have doubled between 1980 and 2002 (Koplin, Liverman, & Kraak, 2005). This increase in the prevalence of overweight among U.S. children is seen in various races and

socioeconomic demographics (CDC, 2008). However, this phenomenon is not spread equally throughout the population (Hass et al., 2003; Kimm et al., 2001; Strauss & Knight, 1999). Research suggests African American and Latino children are more likely to be overweight in early childhood than their Caucasian peers (Hass et al.; Mei et al., 1998). Hass and colleagues found that among younger children (6 - 11 years), children of African American and Latino ethnicities were more likely to be overweight than Caucasian children. In addition, Kimm and colleagues found that African American girls were more likely to be overweight than Caucasian females beginning at age 10. Low cognitive stimulation due to poor home environments, lack of sufficient funds to purchase quality foods, and cultural beliefs and practices have been hypothesized as possible contributors to the disparity in obesity rates between ethnic groups (Hass et al.; Strauss & Knight).

*Contributors to overweight.* The plethora of research on the topic of overweight in the United States has generated multiple variables that may contribute to the steep increase in obesity and overweight in the past 20 years (Koplan, Liverman, & Kraak, 2005). Most notably, the amount of high calorie food and low levels of physical activity have been identified as major contributors to pediatric obesity in the United States (Hill & Peters, 1998). Specifically, the trend toward larger portion sizes, high calorie/high fat snacks, and consuming meals away from home (i.e., restaurants, drive throughs) have been cited as possible contributors to the increase of overweight children in the U.S. (Koplan, Liverman, & Kraak). Fox and colleagues (2004) found that parents of infants and toddlers listed French fries as the vegetable their children most commonly consumed. In addition, 44% of toddlers consume juices sweetened with sugar on a daily basis and

research has found that children who regularly consume sugar sweetened juice have a greater likelihood of being shorter and overweight than children who do not (Fox et al.). These poor eating habits coupled with minimal exercise behaviors lead to a calorie excess that is turned into fat when not expended (Robinson et al., 1993).

When caloric intake exceeds caloric expenditure, fat cells are created (Strong, 2005). Previous research has suggested that 28% of children in the U.S. are not getting the recommended amount of activity needed for healthy development and adequate calorie expenditure (Eaton et al., 2006; Strong). Media use (e.g., watching TV and using the computer) has been cited as a major contributor to the lack of exercise among children in the U.S. (Crespo et al., 2001). In addition, Crespo and colleagues suggest that media have a large influence over the dietary and health activities of young children. Specifically, children who watched over 4 hours of television were more likely to be overweight than children who viewed less (Crespo et al.). One of the possible reasons for an increase in weight that corresponds with an increase in TV watching is a relationship between increased calories consumed while watching TV (Coon & Tucker, 2002; Francis & Birch, 2006). In other words, children tend to consume more food while in front of the television than during other daily activities (Coon & Tucker). In conjunction, some research suggests that TV advertisements may influence the dietary choices children make (Dietz & Gortmaker, 1985). The combination of decreased exercise while participating in sedentary activities (i.e., TV watching, computer use) coupled with the increased food intake that accompanies these activities may be a large contributor to the increase in obesity in the United States (Crespo et al.; Francis & Birch).

An increase in dual worker families (two parents working outside the home) has resulted in most young children spending an average of 32 hours a week in center-based settings (Johnson, 2005). The National Association for Sport and Physical Education (NASPE) recommends preschool aged children engage in at least 60 minutes per day of structured physical activity, several hours of unstructured physical activity, and avoid being sedentary for more than 60 minutes at a time (Kun, 2002). Childcare centers are one of the most used options for early childcare. As a result of the amount of time children spend at these centers, they are integral in helping children achieve a healthy amount of exercise throughout the day. Researchers have identified early childcare centers as large contributors to the amount of physical activity children get during their day (Fin, Johnson, & Specker, 2002; Pate, Pfeifer, Trost, Ziegler, & Dowda, 2004). However, many early childcare centers do not devote adequate time for children to meet the activity guidelines suggested by the NASPE (Kun). It is important that these childcare centers facilitate activity in young children because research has demonstrated that behaviors learned in early childhood often become habit later on in life (McCormic et al., 2006). Because of this, allowing children time to explore various avenues of exercise in early childhood centers is vitally important.

*Effects of childhood overweight.* Numerous physical, mental, social, and academic detriments have been associated with childhood obesity. Children who are overweight run a much greater risk of medical complications than their typically weighted peers (Must & Strauss, 1999; Yanovski, 2001). A child who has a BMI is at or above the 85<sup>th</sup> percentile (at-risk for obesity) in childhood has a greater risk of developing type-II diabetes, asthma, orthopedic difficulties, and various metabolic conditions (Dietz, 1998;

Must & Strauss; Yanovski). The risk of acquiring the diseases listed above continues into adulthood as children who are “at-risk for obesity” are more likely to be obese as adults (Dietz, 1998). Researchers suggest that behaviors learned early on in life set the stage for behaviors as an adult (McCormic et al., 2006). To this end, it is sensible to reason that children who have poor eating, exercise, and general health habits will more than likely continue these habits into later adulthood. As a result, overweight children are at a greater risk to develop additional conditions (i.e., heart diseases, sleep apnea) associated with obesity and overweight in adulthood (Bray, 2004).

Researchers have identified multiple negative social and emotional correlates of overweight in childhood. Depression, negative body image, and lower self-esteem have been shown to correlate positively with childhood overweight (Bell & Morgan, 2000; Datar, Strum, & Magnabosco, 2004; Dietz, 1998; Israel & Ivanova, 2002; Mustillo et al., 2003). Research suggests that children who are chronically overweight are at much greater risk for mental disorders than children who are overweight for a short period in their life (Mustillo et al.). Specifically, Mustillo and colleagues found that children who were chronically overweight (BMI over 95% for more than 3 years of study) were more likely to be clinically diagnosed with oppositional defiant disorder (ODD; for both boys and girls) and depression (only boys) than other children. Several explanations for the co-occurrence of obesity and depression have been cited (Mustillo et al.). For example, poor health associated with depression and overweight and concerns about being overweight have been suggested as reasons for the identified relationship between depression and obesity (Pine, Cohen, Brook, & Coplan, 1997; Ross, 1994). Israel and Ivanova found that as overweight children grow older they become increasingly more likely to demonstrate

negative body image and low self-esteem. Israel and Ivanova's research suggested that adolescent females who were highly overweight were more likely to have a poorer physical self-image than girls moderately overweight. Interestingly, males who were moderately overweight were more likely to have low physical self-image when compared to males who were extremely overweight (Israel & Ivanova). Overall, research has demonstrated that overweight children are more likely to possess self-image beliefs that negatively affect their social interactions (Pierce & Wardle, 1997).

Overweight children have a greater likelihood of poor peer relations, being excessively teased, and ostracized by peers (Mustillo et al., 2003; Neumark-Sztainer et al., 2002). Neumark-Sztainer and colleagues found that both overweight and underweight children were more likely to be teased by family and peers than normally weighted children. In addition, underweight and overweight children were more likely to report sensitivity to teasing from family members and peers (Neumark-Sztainer et al.). Finally, a link between increased teasing from being overweight is positively correlated with a higher prevalence of body image issues and eating disorders (especially for girls; Neumark-Sztainer et al., Stormer & Thompson, 1996).

### *Childhood Underweight*

There is much less research on the issue of childhood underweight in the U.S. than research on overweight children. Research on underweight in the U.S. is less necessary as a result of the decrease in the prevalence rates of underweight in the U.S. over the last 30 years (Onis, Blossner, Borghi, Frongillo, & Morris, 2004). Onis and colleagues have estimated that around 3.1% of children in the U.S. suffer from

underweight. However, underweight has a much greater prevalence worldwide than in the U.S. (Chang, Walker, Grantham-McGregor, & Powell, 2002). Chang and colleagues estimate anywhere from 17% to 25% children worldwide are identified as underweight. In addition, research on underweight is often subsumed into research on stunting in early childhood. Stunting is lack of growth (both height and weight) that is deemed typical for a child's age (UNICEF, 2006). For the purpose of this lit review, stunting and underweight will be used interchangeably as a result of their relationship.

*Contributors to underweight.* Large portions of research on early childhood underweight are conducted in non-industrialized nations as a result of their living conditions (Onis et al., 2004). Non-industrialized nations lack the infrastructure that is necessary to support the food needs of their population. Onis and colleagues identified the lack of cheap, high calorie food available in these nations as a major contributor to high underweight prevalence. In addition, insufficient means to store and distribute food and high disease rates have also been identified as contributors to early childhood underweight (Onis et al.). More plainly put, children in these non-industrialized nations do not have the necessary quantity of food to maintain a healthy weight. Little research exists on the contributing factors to underweight in the United States.

Interestingly, recent research has identified a shift of concentration of underweight throughout the world (Haddad et al., 1999). Haddad and colleagues have suggested previously underweight populations resided in rural areas of unindustrialized nations (e.g., Ethiopia) but are migrating to more urban areas (e.g., large cities in Bangladesh). However, the research on underweight, malnutrition, and food scarcity is sparse (Haddad et al.). As a result, it is important for researchers to investigate the

prevalence of malnutrition in the urban areas of the U.S. to ascertain if a similar migration is occurring.

*Effects of childhood underweight.* Multiple detrimental effects on the development of children have been identified in relation to underweight (e.g., decreased academic achievement, social problems, challenging behaviors; Chang, Walker, Grantham-McGregor, & Powell, 2002; Mendez & Adair, 1999; Walker, Chang, & Powell, 2001; Whaley, Sigman, & Espinosa, 1998). An alarming outcome of early childhood underweight cited in the literature is decreased school achievement (Walker et al.). Underweight children from both industrialized and non-industrialized nations have exhibited poor academic outcomes (Chang et al.). Specifically, children who were diagnosed as underweight were more likely to exhibit conduct problems in school such as an inability to sit still or were disruptive in class (Chang et al.). Chang and colleagues found that children who were underweight scored significantly lower on arithmetic tests than their typically weighted peers. Interestingly, the difference in test scores between underweight and typically weighted children remained significant after controlling for IQ and home and school environment conditions as well (Chang et al.). It is important to note that school and home environment have been shown to play a role in school achievement, so these findings highlight the effects of underweight in childhood (Chang et al.).

Research has shown that young children (1-3 years) who are classified as underweight in early childhood are less likely to be active than their typically weighted peers (Meeks Gardner, Grantham-McGregor, Chang, Himes, & Powell, 1995). Meeks Gardner and colleagues (1999) also found that children who were underweight were more

likely to be difficult babies (e.g., excessive crying, depressed mood) and these children were not as active in environmental explorations. These behaviors (e.g., excessive crying, depressed mood) have been shown to predict later negative behaviors in underweight children (Fernald & Grantham-McGregor, 1998; Meeks Gardner et al.). Specifically, children who were underweight in early childhood were less attentive, more meek, and unenthused than their typically developing peers later on in life (Fernald & Grantham; Meeks Gardner et al.).

In addition to academic achievement, social and emotional deficits have been linked to underweight in children (Chang, Walker, Grantham-McGregor, & Powell, 2002; Maughan, Pickles, Hagell, Rutter, & Yule, 1996). Specifically, negative self-esteem and increased aggressive behavior in early childhood have been shown to be linked to low-birth weight (Chang, Walker, Grantham-McGregor, & Powell). Chang and colleagues' research demonstrated that children with low birth weight tend to have lower self-esteem and show more aggression as they proceed into childhood. Some research has linked the connection between emotional and social issue with academic achievement (Chang et al.; Maughan et al.). Chang and colleagues (2002) hypothesized that emotional and social deficiencies exhibited by underweight children may be serving as a moderator in academic outcomes. More plainly put, underweight children who exhibit social and emotional problems are at a greater risk to exhibit poor academic outcomes.

Researcher have suggested that underweight children throughout the world are more likely to exhibit decreased academic achievement, increased aggressive behaviors, and lower self-esteem (Chang, Walker, Grantham-McGregor, & Powell, 2002; Mendez & Adair, 1999; Walker, Chang, & Powell, 2001; Whaley, Sigman, & Espinosa, 1998).

Though the U.S. does not have the quantity of underweight children that exist worldwide (3.1% U.S., compared to 25% worldwide; UNICEF, 2006), the multiple negative effects of underweight that have been cited warrant additional research.

### *Parents' Perception of Child's Weight*

In early childhood (more so than at any other point in the lifespan) parents possess a large amount of control over their child's diet and exercise patterns (Brown & Ogden, 2004; Lau, Quadrel, & Hartman, 1990; Wardle, 1995). Behaviors and habits that are cultivated in early childhood are more likely to become engrained later on in life (McCormic et al., 2006). As a result it is important that parents be able to identify that their child has a weight problem and seeks the necessary help to begin fixing this problem.

Parents' perceptions about their child or adolescent's weight (overweight, underweight, etc.) may influence their children in other aspects of their development. Levinson and colleagues (1986) found parents' perceptions of their child's or adolescent's (ages 12-17) weight influenced the child's body image perceptions. Specifically, parents' perceptions of their child's and teen's weight were a better predictor of the child's perceptions of their own weight than physician's or social peers' perceptions (Levinson et al.). These findings are important because poor body perceptions have been linked to myriad negative outcomes (e.g., depression, eating disorders; Datar, Strum, & Magnabosco, 2004; Dietz, 1998; Israel & Ivanova, 2002; Must & Strauss, 1999; Mustillo et al., 2003; Yanovski, 2001).

From an intervention standpoint, parents' perceptions of their child's weight may influence how likely they are to participate in changing their child's poor eating and exercise habits (Wald et al., 2007). Rhee et al. (2005) found that parents who were aware that their child was overweight were more likely to participate in intervention. However, it is not the case that parents often correctly identify their as overweight or underweight (Wald et al.; Akerman, Williams, & Meunier, 2007). Wald and colleagues found that parents of overweight children identified that their child was overweight only 49% of the time. In addition, parents of females were more likely to correctly identify their overweight child (63%) when compared to parents of males (36%; Wald et al.). Finally, parents of older children (9-12 years) were more likely to correctly identify a weight problem if their child was overweight (62%) as opposed to parents of younger children (3-6 years old, 17%) (Wald et al.). However, parents' incongruent perceptions of their child's weight do not extend solely to overweight children (Akerman et al.). Akerman and colleagues found that parents of underweight children incorrectly (70%) overestimated their child's weight.

These findings suggest that some negative outcomes of over and underweight in childhood could be related to parents' perceptions of their child's weight. In addition, research has demonstrated that parents often inaccurately estimate their child's weight. (Akerman et al., 2007; Wald et al., 2007). Also, parents tend to participate in weight interventions when they believe their child has a weight problem (Rhee et al., 2005). It is evident that education needs to be directed at parents to improve their ability to identify weight problems in their children. These improvements may increase parents' compliance with weight loss interventions for their children and encourage parents to be

more open to learning about healthy weight, eating, and activities. However, research on parent's perceptions of their child's weight and the influence these perceptions hold is still in its infancy. This deficit in research suggests that additional investigation is needed in the area of parental perceptions of children's weight and effective intervention techniques.

### Conclusion

Overweight in early childhood is a social issue that is garnering increasing attention the U.S. In addition, underweight around the world is a social issue that has far-reaching social implications. Both underweight and overweight are influenced by multiple variables (e.g., social factors, food supply, family income; Crespo et al., 2001; Hill & Peters, 1998; Koplan, Liverman, & Kraak, 2005; Onis et al., 2004). Underweight and overweight both have documented physical, mental, academic, social, and emotional negative effects (e.g., CDC, 2008; Datar, Strum, & Magnabosco, 2004; Dietz, 1998; Israel & Ivanova, 2002; Must & Strauss, 1999; Mustillo et al., 2003; Yanovski, 2001). Finally, parents' role in childhood underweight and overweight cannot be overstated. Parents are more likely to participate actively in their child's weight loss program when they identify a weight problem with their child (Rhee et al., 2005). Unfortunately, parents are not extremely accurate in identifying weight problems in their children (Akermen et al., 2007; Wald et al., 2007).

Additional research must be conducted on both underweight and overweight as both are social issues that will not soon go away. Future research needs to be conducted on best practice for interventions in overweight and underweight. In addition, helping

parents identify healthy and unhealthy weights in their children may improve compliance with interventions.

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### **CHAPTER 3. DIFFERENCES IN PARENTAL PERCEPTIONS OF THE SOCIOEMOTIONAL DEVELOPMENT OF UNDERWEIGHT, OVERWEIGHT, AND TYPICALLY WEIGHTED CHILDREN**

William Henninger, Gayle Luze

#### Introduction

Recently much attention has been paid to the increase in overweight children in the United States. A Center for Disease Control's (CDC) recent report states that an estimated 13.9% of American children aged 2-5 years old are considered overweight (Center for Disease Control, 2008). In addition, United Nations International Children's Emergency Fund (UNICEF) has reported that approximately 2% of the U.S.'s children fall into the category of underweight (United Nations International Children's Emergency Fund, 2006). However, worldwide prevalence of underweight in childhood has been estimated as high as 25% (Chang, Walker, Grantham-McGregor, & Powell, 2002). These statistics identify a disturbing trend in United States whereby children are not getting the appropriate amount or type of calories needed to maintain a healthy weight.

Multiple articles have cited that both underweight and overweight in early childhood can result in numerous detrimental outcomes: physical, cognitive, social, and emotional outcomes (e.g., CDC, 2008; Chang et al., 2002; Datar, Strum, & Magnabosco, 2004; Dietz, 1998; Israel & Ivanova, 2002; Mendez & Adair, 1999; Must & Strauss, 1999; Mustillo et al., 2003; Walker, Chang, & Powell, 2001; Yanovski, 2001). In addition, research indicates that parents' views of their children's weight can influence the children's self image (Levinson et al., 1986). Research suggests that parents of overweight children often underestimate how overweight their children are and parents of

underweight children tend to assume their children's weight is healthier than is actually so (Akerman, Williams, & Meunier, 2007; Wald et al., 2007). However, little is known about the relationship between children's weight and parents' perception of their child's socioemotional development. This research study has been designed to augment the existing data relating to childhood obesity and underweight in relation to parents' perceptions of their socioemotional development from a sample of low-income families.

## Literature Review

### *Childhood Obesity*

In the past two decades the United States has seen a large increase in the prevalence of obesity among children. The number of children diagnosed as at risk for overweight and overweight between the ages of 2 and 5 years have doubled between 1980 and 2002 (Koplan, Liverman, & Kraak, 2005). In addition, some research has found that African American and Latino children are more likely to be overweight than their Caucasian peers (Hass et al., 2003). Low cognitive stimulation due to poor home environments, lack of sufficient funds to purchase quality foods, and culture beliefs and practice have been hypothesized as possible contributors to the disparity in obesity rates between ethnic groups (Hass et al.; Strauss & Knight, 1999).

Multiple reasons have been identified for the steep increase in obesity in the past 20 years (Koplan, Liverman, & Kraak, 2005). Most notably, the amount of high calorie food and decrease in physical activity has been identified as major contributors to pediatric obesity in the United States (Hill & Peters, 1998). Specifically, the trend toward larger portion sizes, high calorie/high fat snacks, and consuming meals away from home

(i.e., restaurants, drive throughs) have been cited as possible contributors to the increase of overweight children in the U.S. (Koplan, Liverman, & Kraak). These poor eating habits coupled with minimal exercise behaviors lead to a calorie excess that is turned into fat when not expended (Robinson et al., 1993).

When caloric intake exceeds caloric expenditure, fat cells are created (Strong, 2005). Researchers have reported that 28% of children are not getting the recommended amount of activity needed for healthy development and adequate calorie expenditure (Eaton et al., 2006; Strong). Among the most notable contributing factors to the lack of physical exercise among children are media use and the influence of media on children's activity and nutritional choices (Crespo et al., 2001). Specifically, television and the role advertisements play in children's dietary choices have been cited as covariates of overweight in children (Crespo et al.; Dietz & Gortmaker, 1985). In addition, several studies have demonstrated an increase in caloric consumption while viewing television (Coon & Tucker, 2002; Francis & Birch, 2006). In other words, children tend to consume more food while in front of the television than during other daily activities (Coon & Tucker). The combination of decreased exercise while participating in sedentary activities (i.e., TV watching, computer use) coupled with the increased food intake that accompanies these activities may be a large contributor to the increase in obesity in the United States (Crespo et al.; Francis & Birch).

Numerous physical, mental, social, and academic detriments have been associated with childhood overweight. Children who are overweight run a much greater risk of medical complications than their typically weighted peers (Must & Strauss, 1999; Yanovski, 2001). A child who has a BMI in the 85th percentile or greater (at-risk for

obesity) in childhood is associated with increases in Type-II diabetes, asthma, orthopedic difficulties, and various metabolic conditions (Dietz, 1998; Must & Strauss; Yanovski). The risk of acquiring the diseases listed above continues into adulthood as children who are “at-risk for obesity” are more likely to be obese as adults (Dietz). As a result, overweight children are at a greater risk to develop additional conditions (i.e., heart disease, sleep apnea) associated with obesity and overweight in adulthood (Bray, 2004).

Research has identified multiple negative social and emotional correlates of overweight in childhood. Depression, negative body image, and lower self-esteem have been shown to positively correlate with childhood overweight (Datar, Strum, & Magnabosco, 2004; Dietz, 1998; Israel & Ivanova, 2002; Mustillo et al., 2003). Research suggests that children who are chronically overweight are at much greater risk for mental disorders than children who are overweight for a short period in their life (Mustillo et al.). Specifically, Mustillo and colleagues found that children who were chronically overweight (BMI over the 95<sup>th</sup> percentile for more than 3 years of study) were more likely to be clinically diagnosed with oppositional defiant disorder (ODD; for both boys and girls) and depression (only boys). Furthermore, Israel and Ivanova found that as overweight children grow older they become increasingly more likely to exhibit negative body image and low self-esteem.

Researchers have documented relationships between overweight in childhood and poor peer relations, being excessively teased, and ostracized by peers (Mustillo et al., 2003; Neumark-Sztainer et al., 2002). Neumark-Sztainer and colleagues found that both overweight and underweight children were more likely to be teased by family and peers, and report sensitivity to this teasing. In addition, research has demonstrated that the

increased teasing associated with being overweight is positively correlated with a higher prevalence of body image issues (especially for girls; Neumark-Sztainer et al., Storer & Thompson, 1996).

### *Childhood Underweight*

The issue of underweight in early childhood in the U.S. has garnered much less attention than the issue of childhood obesity in recent years. A major reason for this lack of research is the decrease in the prevalence rates of underweight in the U.S. over the last 30 years (Onis, Blossner, Borghi, Frongillo, & Morris, 2004). The most recent estimates for the occurrence of underweight in the U.S. are about 3.1% (Onis et al.). In addition, worldwide there is a much greater prevalence of underweight among children than in the U.S., with estimates anywhere from 17% to 25% (Chang, Walker, Grantham-McGregor, & Powell, 2002).

A majority of research on childhood underweight is conducted in non-industrialized nations as a result of their living conditions (Onis et al., 2004). Onis and colleagues identified the lack of cheap, high-calorie food available in these nations as a major contributor to high underweight prevalence. In addition, insufficient means to store and distribute food and high disease rates have also been identified as contributors to early childhood underweight (Onis et al.). Little research exists on the contributing factors to underweight in the United States. Future research is needed to identify reasons why a small but meaningful section of the United States youth is diagnosed as underweight.

Multiple detrimental effects on the development of children have been identified in relation to underweight (Chang et al., 2002; Mendez & Adair, 1999; Walker, Chang, &

Powell, 2001; Whaley, Sigman, & Espinosa, 1998). Among the most notable detrimental effects to development was decreased school achievement (Walker et al.). Academic deficiencies related to underweight in children have been identified in both industrialized and non-industrialized nations (Chang et al.). Specifically, children who were diagnosed as “underweight” were more likely to exhibit conduct problems in school (Chang et al.). Also, underweight children were more likely to score lower on arithmetic tests than their typically weighted peers, when controlling for IQ. In addition, these effects remained significant after controlling for home and school environment conditions that have been found to play a role in influencing achievement (Chang et al.).

In addition to academic achievement, social and emotional deficits have been linked to underweight in children (Chang et al., 2002; Maughan, Pickles, Hagell, Rutter, & Yule, 1996). Specifically, self-esteem and aggressive behavior in early childhood have been shown to be strongly positively correlated with birth weight (Chang et al.). In other words, children with low birth weight tend to have lower self-esteem and show more aggression. As a result of their study, Chang and colleagues hypothesized that emotional and social deficiencies exhibited by underweight children may be serving as a moderator in academic outcomes. Existing research has identified multiple negative outcomes (i.e., poor academic achievement, increased aggressive behaviors, lower self-esteem) for underweight in early childhood (Chang et al.; Mendez & Adair, 1999; Walker et al., 2001; Whaley, Sigman, & Espinosa, 1998), suggesting that even with a low prevalence rate, childhood underweight in the U.S. needs additional research.

### *Study Purpose*

The purpose of this study is to investigate the differences among overweight, underweight, and typically weighted children's socioemotional development. The following research questions were addressed:

- 1). What is the proportion of underweight and overweight preschool children in a low-income sample?
- 2). In what ways do underweight, overweight, and typically-weighted children differ in respect to their demographic characteristics by (ethnicity, family income, and household size)?
- 3). Do underweight, overweight, and typically-weighted children differ in relation to additional health conditions?
- 4). Do caregivers of underweight, overweight, and typically-weighted children differ in their rates of depression?
- 5). How do caregivers' perceptions of underweight, overweight, and typically-weighted children's socioemotional development differ?

### Method

#### *Early Head Start Research and Evaluation Project*

Data utilized in this study were part of the larger *Early Head Start Research and Evaluation Project (EHSRE)*. A national, multiple-site research project, EHSRE was conducted to assess the effects of Early Head Start (EHS) on child and family outcomes. All families who applied for EHS services between July 1996 and September 1998 and who met additional screening criteria at each participating site were included in the study.

In addition, families who did not meet income criteria but would benefit from services were considered for participation in EHS services and the evaluation study. Finally, some sites recruited specific populations for participation (i.e., migrant families, teen mothers, families with children who had disabilities). Each site was allowed to set its own participation criteria using income (federal poverty guidelines) as one criterion. In total, 3,001 families were selected as participants in the original study (Administration on Children, Youth, and Families, 2002).

The original study was a randomized control design. As a result, each site was required to recruit twice as many participants as they could serve in EHS. Eligible families were randomly assigned into control (1,488) and experimental (1,513) groups upon admission. The control and experimental groups demonstrated no statistically significant difference on basic demographic characteristics (e.g., age, income, ethnicity). Control families were not allowed to participate in EHS services, but could utilize other services provided in their respective communities. Upon turning 3 years of age, control children and families were allowed to access Head Start Services.

Initial data collection occurred after the family enrolled in the study and continued until the child was three years of age. A longitudinal follow-up was conducted the spring and summer before children were age-eligible for kindergarten (i.e., children would be five years of age by fall enrollment dates). This extended study sought to augment the existing knowledge gleaned from the initial EHS research (Administration on Children, Youth, and Families, 2002). The follow-up focused on services received since the child turned three years old and the child's preparation for kindergarten. Frequently cited

reasons for participant non-response were an inability to locate families and refusal of participation (Administration on Children, Youth, and Families, 2002).

The current study utilized data primarily from the longitudinal follow-up, but also included some data from the original study. Primarily, data about the age and ethnicity of the child were obtained from the initial EHS interview. Demographic information was gathered from participants during initial application and at scheduled EHS interviews. These interviews were conducted between the child's third birthday and their entrance into kindergarten. Items included information about income, education, and housing arrangements (i.e., how many children live in this house). Questions pertaining to family income, primary caregiver's level of education, and child's age were utilized for analysis. Participants were included in this study if they answered "yes" or "no" to the interview question, "since the age of 3 my child has been diagnosed as overweight" or "since the age of 3 my child has been diagnosed as underweight."

Approval from the Institutional Review Board (IRB) was sought to conduct this study. As a result of the secondary nature of this data, original IRB approval was deemed sufficient to conduct this research by Iowa State University's IRB.

### *Participants*

Participants included in analysis for this study were 2,059 families (children and caregivers). Participating families completed interview questions pertaining to their children's weight and behavior during the prekindergarten follow up study. A majority of caregivers were from the following groups: "white/Caucasian," "Black/African American," and "Hispanic/Latino." Table 1 presents demographic description of participants.

Children included in this assessment had a mean age of 63 months ( $SD = 4.26$ ). In this study there were 1,061 males, and 995 females. Families were asked to select their monthly income from a categorical list of incomes. The median monthly income reported by families participating in this study was \$1,600—\$1,800, with a range of less than \$200 per month to greater than \$3,000 a month.

Table 1

## Demographic Variables for Families Participating in Study

Variable	Total(%)	Underweight(%)	Overweight(%)	Typical(%)
Child	2,059 (100)	71(3.4)	44(2.1)	1,944(94.4)
Gender				
Male	1,061 (51.5)	41(57.7)	18 (40.9)	1,002(48.7)
Female	995 (48.3)	30(42.3)	26 (59.1)	939(48.3)
Mean Age (months)	63.0	63.0	64.14	62.98
Race				
White	480 (23.3)	23 (32.4)	8 (18.2)	449 (23.1)
African Am.	444 (21.5)	16 (22.5)	9 (20.5)	419 (21.6)
Hispanic	343 (16.7)	11 (15.5)	10 (22.7)	322 (16.6)
Other	173 (8.4)	8 (11.3)	3 (6.8)	162 (8.3)
Missing	619 (30.1)	13 (18.3)	14 (31.8)	504 (25.9)
Parent				
Relationship to				
Child				

Table 1. (continued)

Variable	Total(%)	Underweight(%)	Overweight(%)	Typical(%)
Mother	1,983 (96.3)	60 (84.5)	42 (95.5)	1,790 (92.1)
Father	38 (1.8)	3 (4.2)	0 (0.0)	35 (1.8)
Grandmother	43 (2.1)	2 (2.8)	2 (4.5)	39 (2.0)
Other Relative	13 (.63)	2 (2.8)	0 (0.0)	11 (6.6)
Education of respondents				
< High School	589 (28.6)	21 (29.6)	14 (31.8)	554 (28.5)
Diploma/GED	1,369 (66.5)	46 (64.8)	28 (63.6)	1,295 (66.6)
> Diploma/ GED	101 (4.9)	4 (5.6)	3 (6.8)	95 (4.9)
Family				
Mean # of People in household	4.61	4.85	4.66	4.60
Annual Income				
<\$2,400	21 (1.0)	0 (0.0)	0 (0.0)	21 (1.1)
\$2,400 - \$12,000	408 (19.8)	10 (14.1)	11 (0.3)	387 (19.9)
\$12,000 - \$24,000	706 (34.3)	31 (43.7)	17 (38.5)	658 (33.8)
\$24,000 - \$36,000	397 (19.3)	14 (19.7)	7 (15.9)	376 (19.3)
>\$36,000	370 (18.0)	11 (15.5)	5 (11.4)	354 (18.2)
Missing	157 (7.6)	5 (7.0)	4 (11.1)	149 (7.7)

### *Measures*

*Child weight.* For the purpose of this study, children were grouped into categories of underweight, overweight, and typically weighted. Groupings were made utilizing a health variable from the parent interview data that asked parents whether their child had been diagnosed by a health professional or any other professional as *overweight* ( $n = 44$ ) or *underweight* ( $n = 71$ ) since the child's third birthday. Parents who did not signify that their child had been diagnosed as either *overweight* or *underweight* were placed in the typically weighted category ( $n = 1,944$ ).

*Additional health conditions.* Additional health conditions were measured utilizing a question in the TPK parent interview. Caregivers were asked if their children had been diagnosed with any of several health conditions (e.g., asthma, high blood pressure) since the children's third birthdays. Caregivers were given the option of answering these questions with a *yes* or *no* answer. Table 2 displays the occurrence of each condition by group and total for sample.

*Caregiver depression.* Caregiver depression was measured using an abbreviated version of the "Center for Epidemiologic Studies Depression Scale" (CES-D; Radloff, 1977). The shortened version of the CESD included 12 questions pertaining to the mother's feelings of sadness, loneliness, and appetite. Caregivers were asked how many times they had experienced these feelings in the last week. Responses ranged from;  $1 =$  *Rarely or Never (Less than one day)*, to  $4 =$  *Most or all days (5-7 days)*. Scores were summed to create a composite score for each participant. A composite score was summed from the 12 questions parents answered. A higher score on the caregiver depression

measure signified a greater number of depressive symptoms for caregivers. Groups were compared on a mean composite score of depression.

*Socioemotional development.* Parents rated their children's social competence, behavior, and school readiness. The "social and emotional development" rating scale had possible response choices ranging from; *1 = not true*, to *2 = being somewhat or sometimes true*, to *3 = being very often true*. Parents were instructed to answer questions based on how their children had behaved in the last two months. The questions included items about the children's mood (e.g., in the last two months my child has been unhappy, sad, or depressed), behavior at home (e.g., in the last two months my child is disobedient at home), school readiness (e.g., in the last two months my child acts too young for his or her age), and social competence (e.g., in the last two months my child comforts or helps others).

The social and emotional development rating scale questions were adapted from the Family and Child Experiences Survey (Administration on Children, Youth, and Families, 2002), the Teachers and Observers Ratings of Children's Social skills (Elliot, Gresham, Freeman, & McCloskey 1988), and the Child Behavior Checklist (CBCL; Achenbach, & Rescorla, 2000). Questions were selected to be included in this section of the Early Head Start parent interview by utilizing an expert panel comprised of members of the FACES research team and Head Start Quality Research Consortium. Panelists selected questions they felt best comprised a broad picture of social competence, school readiness, and child behavior (Administration on Children, Youth, and Families). Currently, no evidence to support reliability and validity of the bank of questions as a

scale has been published. As a result, differences between groups on the items will be analyzed individually.

## Results

*What is the proportion of underweight and overweight preschool children in the Early Head Start Research and Evaluation Project sample?*

Two-thousand fifty nine ( $N = 2,059$ ) participants who responded to the interview question about their child's were included in this research study. Participants were divided in to three groups consisting of *underweight* 3.4% ( $n = 71$ ), *overweight* 2.1% ( $n = 44$ ), and *typically weighted* 94.4% ( $n = 1,944$ ).

*In what ways do underweight, overweight, and typically-weighted children differ in respect to their demographic characteristics (ethnicity, family income, and household size)?*

Difference and similarities were investigated between these groups on several demographic variables. Refer to Table 1 for in-depth description of demographic variables of participants. ANOVA did not reveal statistically significant differences between groups in relation to the distribution of child sex. Ethnic differences between groups were explored using a chi-square test of independence, as a result of the categorical nature of the data. Chi-square results suggested that no statistically significant differences existed between groups on ethnicity,  $\chi^2(6, N = 1,440) = 3.29, p = .77$ . Group means for family income and household size were compared utilizing a one-way ANOVA. A one-way ANOVA indicated that underweight, overweight, and typically weighted groups did not differ significantly on the measure of annual family income,  $F$

(2, 1,901) = .814,  $p = .44$ . A one-way ANOVA indicated underweight ( $M = 4.85$ ,  $SD = 1.94$ ), overweight ( $M = 4.66$ ,  $SD = 1.70$ ), and typically weighted ( $M = 4.60$ ,  $SD = 1.72$ ) groups did not differ significantly on average amount of people living in household,  $F(2, 2,058) = .71$ ,  $p = .49$ .

*Do underweight, overweight, and typically-weighted children differ in relation to additional health conditions?*

Differences in occurrence of additional health conditions were examined using a chi-square test of independence. For each health condition, a separate analysis was run and no significance differences of prevalence of health conditions between groups were identified. In addition, groups were compared on total combined conditions to identify differences in amount of conditions. No significant difference was identified for total number of health conditions and weight status of the child.

Table 2

*Medical Conditions Identified by a Health Professional*

Medical condition	Underweight (% of group <i>N</i> )	Overweight (% of group <i>N</i> )	Typical weight (% of group <i>N</i> )	Total
Allergies	19 (26.8)	12 (27.3)	328 (16.9)	359
Anemia	5 (7.0)	0 (0.0)	47 (2.4)	52
Asthma	17 (23.9)	11 (25.0)	266 (13.7)	294
Diabetes	0 (0.0)	0 (0.0)	1 (0.1)	1
Epilepsy	1 (1.4)	1 (2.3)	8 (0.4)	10
Hearing Problems	9 (12.7)	7 (15.9)	75 (3.9)	91
High Blood Pressure	0 (0.0)	1 (2.3)	11 (0.6)	12
Injuries Needing Medical Attention	12 (16.9)	5 (11.6)	222 (11.4)	239
Kidney Problems	6 (8.5)	4 (9.1)	58 (3.0)	68
Lead Poisoning	2 (2.8)	0 (0.0)	19 (1.0)	21
Short Stature	15 (21.1)	3 (6.8)	24 (1.2)	42
Vision Problems	13 (18.3)	6 (13.6)	126 (6.6)	147
Total	85	51	1,255	1,412

*Do caregivers of underweight, overweight, and typically weighted children differ in their rates of depression?*

Caregiver depression comparisons between groups were assessed using a one-way ANOVA. Results indicated that a significant difference existed between groups

(underweight, overweight, typically weighted),  $F(2, 2,045) = 11.357, p < .001$ . As a result of unequal variance between groups and unequal group sizes, Hochberg's GT2 (Hochberg, 1974) was utilized for post hoc analysis. The average depression for caregivers of underweight children ( $M = 11.90, SD = 8.51$ ) was significantly higher than average caregiver depression scores for typically weight children ( $M = 7.88, SD = 7.05$ ),  $t(2003) = 3.09, p < .001$ .

*How do caregivers' perceptions of underweight, overweight, and typically-weighted children's socioemotional development differ?*

To test the hypothesis that overweight, underweight, and typical weighted children would differ in socioemotional development, a two-way analysis of variance (ANOVA) was conducted using the *socioemotional development* items as outcome variables. Child weight was used as a nominal predictor variable. Because caregiver depression scores differed significantly between groups in preliminary analysis, caregiver depression was a covariate.

Table 3.

*Test of Socioemotional Development while controlling for Caregiver Depression*

Question	Group Marginal Means		
	Underweight	Overweight	Typical Weight
Makes friends easily	2.73	2.63	2.77
Child enjoys learning*	2.66#	2.84	2.81#
Has hot temper tantrums	1.91	1.82	1.96

Table 3. (continued)

Question	Group Marginal Means		
	Underweight	Overweight	Typical Weight
Cannot concentrate or pay attention	1.78	1.66	1.68
Likes to try new things	2.78	2.84	2.79
Show imagination in work and play	2.81	2.91	2.80
Unhappy, sad, or depressed	1.23	1.29	1.20
Comforts or helps others	2.61	2.65	2.59
Hits and fights with others	1.70	1.75	1.70
Worries about things	1.44	1.57	1.45
Accepts friends ideas in sharing and playing	2.45	2.42	2.40
Does get along with others	1.36	1.33	1.29
Feels worthless and inferior	1.07	1.07	1.08
Makes changes with difficulty	1.46	1.37	1.34
Nervous and high strung/tense	1.43	1.22	1.28
Acts too young for age	1.31	1.28	1.20
Disobedient at home	1.69	1.59	1.67
Cannot stand waiting	2.04	2.14	2.04
Cries a lot	1.42	1.48	1.40
Cruel to animals	1.06	1.09	1.06

Table 3. (continued)

Question	Group Marginal Means		
	Underweight	Question	Underweight
Defiant	1.55	1.41	1.50
Demands met immediately	1.50	1.77	1.70
Destroys own things	1.37	1.34	1.37
Destroys others things	1.31	1.24	1.28
Disobedient	1.58	1.50	1.53
Disturbed by routine change	1.51	1.38	1.42
Does not answer people ** ^	1.84#	1.57	1.60#
Does not feel guilty for misbehaving	1.51	1.53	1.50
Easily frustrated	1.86	1.68	1.75
Easily Jealous	1.84	1.92	1.80
Gets hurt a lot/accident prone * ^	1.67#	1.43	1.43#
Gets into many fights	1.29	1.15	1.19
Gets into everything	1.85	1.94	1.72
Trouble getting to sleep ** ^	1.59#	1.22#	1.42
Hits others	1.53	1.47	1.46
Angry Moods	1.68	1.70	1.68
Physically attacks people	1.17	1.22	1.17
Quickly shifts activities	2.16	1.97	2.07

Table 3. (continued)

Question	Group Marginal Means		
	Underweight	Question	Underweight
Screams a lot	1.48	1.46	1.46
Selfish will not share	1.55	1.59	1.50
Stubborn, sullen, irritable	1.66	1.77	1.69
Sudden changes in mood or feelings	1.52	1.40	1.50
Sulks a lot	1.42	1.45	1.35
Talks or cries in sleep	1.37	1.34	1.30
Uncooperative	1.46	1.36	1.44
Unusually loud	1.57	1.45	1.59
Wakes often at night	1.37	1.32	1.26
Wants a lot of attention	2.32	2.08	2.15
Whines	1.82	1.82	1.78
Speech Problems	1.47	1.36	1.30

\* $p < .05$ , \*\*  $p < .01$ , \*\*\* $p < .001$ ; # significant difference between groups; ^ caregiver depression significant predictor

For the outcome variable *child does not answer people*, the two-way ANOVA predicted 3% of the variance of the scores. Child weight was a significant predictor of the child's ability to answer people while controlling for caregiver depression  $F(2, 2,028) = 5.66, p < .01$ . Underweight children were most likely to be rated as *not likely to answer people* ( $M = 1.84, SD = .65$ ). When compared to typically weighted children ( $M = 1.60, SD = .59$ ), underweight children were significantly less likely to answer people at the  $p <$

.01 level. Overweight children ( $M = 1.57$ ,  $SD = .50$ ) did not differ significantly from either of the other groups. Caregiver depression did play a significant role in “children not answering people,” as higher depression scores were related to the likelihood of not answering people ( $p < .001$ ).

For the outcome variable *child has trouble getting to sleep*, the two-way ANOVA predicted 3.7% percent of the variance. Child weight was a significant predictor of a caregiver ratings of how hard it was for their child to get to sleep, while controlling for caregiver depression  $F(2, 2,030) = 4.66$ ,  $p < .05$ . Underweight children were most likely to *have trouble getting to sleep* ( $M = 1.59$ ,  $SD = .76$ ). Underweight children differed significantly from overweight children ( $M = 1.22$ ,  $SD = .57$ ;  $p < .05$ ). However, typically weighted children ( $M = 1.42$ ,  $SD = .65$ ) did not differ significantly from either of the groups. Caregiver depression did played a significant role in children’s difficulty getting to sleep, as higher depression scores were related to a greater likelihood of having trouble getting to sleep ( $p < .001$ ).

For the outcome variable *child gets hurt a lot*, the two-way ANOVA predicted 3.6% of the variance in the caregiver ratings. Child weight was a significant predictor of parents rating of how often their child got hurt, while controlling for caregiver depression  $F(2, 2029) = 4.19$ ,  $p < .05$ . Underweight children were most likely to get hurt ( $M = 1.67$ ,  $SD = .74$ ). There was a significant difference between caregiver ratings of their child’s likelihood of getting hurt between underweight and typically weighted ( $M = 1.43$ ,  $SD = .66$ ) children at the  $p < .05$  level. However, overweight children ( $M = 1.43$ ,  $SD = .65$ ) did not differ significantly from either of the other groups. Caregiver depression did play a significant role in how likely a caregiver was to rate their child as having problem going

to sleep, as higher depression scores were related to a greater likelihood of having trouble falling to sleep ( $p < .05$ ).

For the outcome variable *child is restless and fidgets*, the two-way ANOVA predicted 2.9% of the variance. Child weight was a significant predictor of ratings of restlessness and fidgeting while controlling for caregiver depression  $F(2, 2,037) = 2.97$ ,  $p = .05$ . Underweight children ( $M = 1.77$ ,  $SD = .74$ ) were rated significantly higher than typically weighted children ( $M = 1.52$ ,  $SD = .74$ ) on caregiver ratings of fidgeting or restless at the  $p = .05$  level. Overweight children ( $M = 1.67$ ,  $SD = .70$ ) did not differ significantly from the other weight groups. Caregiver depression did play a significant role in caregivers' ratings of child restlessness and fidgeting, as higher depression scores were related to a greater likelihood of higher ratings for fidgeting and restlessness.

For the outcome variable *child enjoys learning*, the two-way ANOVA predicted 0.7% of the variance. Child's weight was a significant predictor of caregivers' ratings of how much their child enjoyed learning while controlling for caregiver depression  $F(2, 2,036) = 5.227$ ,  $p < .01$ . Typically weighted children were most likely to enjoy learning ( $M = 2.81$ ,  $SD = .41$ ). As a result, typically weighted children differed significantly from underweight children ( $M = 2.66$ ,  $SD = .51$ ) on caregiver ratings of how likely their child was to enjoy learning at the  $p < .01$ . However, overweight children ( $M = 2.84$ ,  $SD = .37$ ) did not differ significantly with either group on these ratings. Caregiver depression did not play a significant role in caregivers' ratings of child enjoyment of learning,  $p = .16$ .

## Discussion

The goals of this study were to identify difference among overweight, underweight, and typically weighted children within the EHSRE data set on measures of socioemotional development. A grouping variable was developed based on parents' report on whether a health professional had diagnosed their child as overweight or underweight. Analyses did not identify any difference in prevalence of overweight or underweight between original EHSRE treatment and control groups. Research questions were answered utilizing the underweight, overweight and typically weighted grouping. Specifically, analysis identified that there were a greater number of participants who were underweight than overweight. This result is contrary to existing research that indicates there are more overweight children in the U.S. than underweight (CDC, 2008; UNICEF, 2006). Hadded and colleagues (1999) suggest the worldwide prevalence of underweight is becoming more concentrated in urban areas. However, little research exists to suggest the U.S. is experiencing this trend. To this end, we were unsure as to why a relatively heavy concentration of underweight children was represented in the data set.

No differences in household size, ethnicity, or family income were identified between groups. Families recruited for the EHS data set were largely considered for participation if they fell below the poverty line, therefore participants may have been more homogeneous than a nationally representative sample. However, it should be noted, previous research suggests a greater likelihood that children of families with lower socioeconomic status to have a greater likelihood of obesity or underweight (Hass et al., 2003).

Differences in levels of caregiver depression between groups were identified. Specifically, caregivers of underweight children were more likely to report depressive symptoms than those of typically weighted children. Research has indicated that low-income mothers are more likely to exhibit higher depression than mothers from upper- and middle-income families (Liaw & Brooks-Gunn, 1994). As part of the inclusion criteria, families participating in this study were from a *low-income* population. As a result, it is not surprising that increased depression scores were prevalent in the sample. Bronte-Tinkew and colleagues' (2007) research suggests a relationship between food scarcity and depression among caregivers in low-income families. However, previous research suggests that food insecurity in the U.S. is correlated with overweight as opposed to underweight (Alaimo, Olson, & Frongillo, 2001).

Research on the relationship between caregiver/maternal depression and underweight is not abundant. However, some research suggests that in developing countries higher rates of depression and underweight are related (Rahman et al., 2002; Rahman et al., 2004). Rahman and colleagues found that children of depressed mothers in rural Pakistan were more likely to exhibit growth retardation than children of non-depressed mothers. Rahmn and colleagues suggest that maternal depression may negatively affect a mother's ability to perform typical physical and emotional care for their children. However, this research was conducted in a developing nation and may not be generalizable to our sample.

It should be noted that caregivers of underweight children had higher depression scores, but these scores do not signify they are *depressed*. It appears that there may be some evidence to suggest a link between maternal depression and underweight in some

research samples (Rahman et al., 2002; Rahman et al., 2004). Alarming, the link between maternal depression and negative early childhood development has been well documented (e.g. Field, 1995; Murray, 1992; Petterson & Burke, 2001). These findings suggest additional research must be conducted on the link between childhood weight and maternal/caregiver depression.

Differences between underweight and typically weighted children were observed on measures of socioemotional development. Specifically, underweight children were reported to be less likely to respond when spoken to, get hurt often, be fidgety, and enjoy learning less when compared to their typically weighted peers. In addition, underweight peers were more likely to have problems falling asleep than their overweight peers. Previous research suggests that underweight children are more likely to exhibit socioemotional issues (e.g., low-self esteem, aggression, poor academic achievement) than their typically weighted peers (Chang & Powell, 2001; Chang et al., 2002; Mendez & Adair, 1999; Walker, Whaley, Sigman, & Espinosa, 1998). The findings in this study are congruent with previous research that identifies underweight children as a group that needs intervention. However, little research exists on differences between overweight and underweight children on socioemotional development. As a result, the finding that underweight children were more likely to be rated as having a difficult time going to sleep when compared to their overweight peers is novel; but perhaps not surprising. Children who are underweight are not getting enough calories, and may have difficulty sleeping if their body's needs are not satisfied.

### *Limitations*

Several limitations can be identified with this study. The categorization of participants was based on parents' reports of diagnosis of underweight or overweight for each child by a health professional. Researchers did not check these statements for accuracy; as a result, some participants may have answered the questions incorrectly. In addition, little is known about the method in which the medical practitioners assessed overweight and underweight in these participants (i.e., BMI). To this end, it would have been more desirable to have an exact BMI for each child.

A second limitation of this study is the small sample size of the overweight group. As a result of the small sample size, statistical power was minimal, resulting in few significant differences between groups. With the well-documented rise in overweight among children and adolescents residing in the U.S. (CDC, 2008), research may need to investigate the time in child development when childhood overweight rates begin to accelerate. Findings suggest for some children an initial occurrence in overweight begins between the ages of 4-8 when adipose rebound begins (Wisnandle, Maynard, Guo, & Siervogel, 2000). However, Wisnandle and colleagues also note that multiple variables (e.g., genetics, SES, physical activity) are linked with the onset of overweight in childhood and as a result age of onset is variable. Additional findings on the age of onset for overweight may lead to better understanding of when interventions should be instigated.

The socioemotional ratings of children were made by the children's caregivers. As a result, ratings of socioemotional development reflect the caregivers' views of their children's development. It may be the case that parents are influenced by their child's

weight, and this influence may bias the caregivers' ratings of their children. Future researchers should focus on utilizing independent researchers to investigate the effect of weight on parents' ratings of their child socioemotional development.

A greater likelihood of finding chance difference between groups on the social and emotional development rating was possible as a result of the number of analyses used. By comparing groups on each separate question a greater likelihood of finding chance difference between groups occurs, as opposed to creating a composite variable. However, we were interested in specific topics of concern between groups (e.g., do underweight children hit more? Do overweight children have a harder time falling to sleep?) as opposed to comparing global ratings. These findings suggest specific areas in which the groups may differ and where future research should be conducted. Future research should compare groups using a composite score to identify any global socioemotional differences.

### *Implications*

These findings, taken in conjunction with existing research, suggest that underweight in early childhood can affect negatively the socioemotional development of a young child. Caregivers of underweight children were also more likely to have a higher depression score than the others groups. The disparity found in this study between caregivers' ratings of socioemotional development of underweight and typically weighted children is congruent with research on worldwide underweight populations, but also identifies that underweight children in this sample are exhibiting negative socioemotional outcomes. These findings suggest that, although the proportion of underweight children

in the U.S. is small (3%) and has decreased over the last 30 years (Onis et al., 2004), there is a need for research on this population of children.

Few differences between overweight and typically weighted or underweight children were found. Previous research suggests that there is a plethora of mental, physical, and social issues that can arise from being overweight in childhood (i.e., Datar et al., 2004; Israel & Ivanova, 2002; Mustillo et al., 2003). The findings of this study should not be taken as a dissenting voice on previous research, but as additional data that augment the current research on the affects of obesity in early childhood. These findings suggest that additional research on the timing of socioemotional delays related to childhood overweight needs to be conducted.

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## CHAPTER 4. GENERAL CONCLUSIONS

### General Discussion

Research indicates that both underweight and overweight in childhood are phenomenon's that beg for research on prevention and intervention. Findings suggest that overweight in early childhood has doubled in the past 30 years (CDC, 2008). In addition, 25% of children in the world are underweight (UNICEF, 2006). In the United States research reports a much higher proportion of overweight children (13.9 %) to underweight children (2%; CDC; UNICEF). However, in our data set there was almost double the amount of underweight compared to overweight ( $n = 71$  to  $n = 44$ , respectively). We were unable to find research to suggest a reason for these find, but hypothesized the young age of the children may have played a role.

Overweight in early childhood appears to have multiple contributors. Some of the contributing factors to overweight in childhood are; lack of exercise, increased T.V. watching, and increased calorie consumption (Koplan, Liverman, & Kraak, 2005). Children who are overweight run a greater risk for social, emotional, and physical issues during and after childhood (e.g., CDC, 2008; Datar, Strum, Magnabosco, 2004; Dietz, 1998; Israel & Ivanova, 2002; Must & Strauss, 1999; Mustillo, et al., 2003; Yanovski, 2001). However, research conducted for this thesis showed little difference between overweight children and underweight or typically weighted children in our sample. Researchers hypothesized that the small sample size and young age of the children may be an explanation for the lack of differences in socioemotional development between the overweight and typically weighted groups.

Research suggests that underweight in early childhood may result from a lack of cheap high calorie food and insufficient means to transfer and distribute this food (Onis et al., 2004). Children who are underweight in childhood are at a greater risk to experiencing social, emotional, academic, and cognitive issues than their typically weighted peers (e.g., Chang, Walker, Grantham-McGregor, & Powell, 2002; Mendez & Adair, 1999; Walker, Chang, & Powell, 2001; Whaley, Sigman, & Espinosa, 1998). Our findings found similar results in that underweight children differed significantly from their typically weighted peers on measures of social emotional development (e.g., underweight children were more likely to not respond when spoken to, get hurt often, be fidgety, and enjoy learning less when compared to their typically weighted peers). Little difference between underweight and overweight children was found on measure of socioemotional development. To this end, these findings suggest that though there is a small population of underweight children, they are still experiencing development problems.

In our study, caregivers of underweight children were more likely to have higher depression scores than caregivers of the typically weighted peer group. Research suggests that a higher portion of mothers in low-income areas experience depression than mothers of typical or high income (Liaw & Brooks-Gunn, 1994). But there is little research that suggests mothers of underweight children are more likely to be depressed. We felt that this difference was alarming and warrants additional research.

### Future Research Implications

Several areas of future research are suggested from these findings. Research investigating age of onset of the multiple developmental problems overweight children face needs to be conducted. Looking at our research along with previous research, it seems possible that there is a particular age when children begin to experience the negative outcomes associated with overweight. To this end, it is important that researchers identify when children start to exhibit negative outcomes in conjunction with overweight. Identifying age of onset for these outcomes may influence intervention and prevention strategies.

Research investigating the link between maternal depression and underweight children needs to be conducted. Our data suggests that mothers of underweight children were more likely to be depressed than overweight or typically weighted peers. Existing research suggest that maternal depression is linked in multiple negative outcomes for children (Alaimo, Olson, & Frongillo, 2001). As a result, researchers need to identify any links between underweight and caregiver depression. If a significant link exists researchers may be able to identify intervention strategies to mitigate the affect of one variable on the other.

Finally, research aimed at identifying how underweight will affect children in the U.S. needs to be conducted. Specifically, how underweight children will differ in regards to their socioemotional development compared to underweight children worldwide, overweight children in the U.S., and typically weighted U.S. children. Children in the U.S. may have access to better healthcare and food sources than children usually studied

for underweight. As a result, the developmental detriments they experience may differ from worldwide underweight children.

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