

RELATION BETWEEN BODY MASS INDEX
AND AGGRESSION AMONG
FIRST GRADE CHILDREN

By

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CHAPTER I

INTRODUCTION

Relation between Body Mass Index and Aggression in First Grade Children

Obesity is a growing problem in America as well as many other countries. The rate of childhood obesity is tripling in not only the United States, but also in Canada, Great Britain, and even China (Johnston, 2004; Ogden, 2006). Obesity is a concern because it is associated with many health problems such as diabetes and heart disease (National Heart, Lung and Blood Institute, 1998). More children may be leading a more sedentary lifestyle than in the past. The increase in popularity of video games and computer-based activities may be helping contribute to the rise in obesity. Recent studies have shown that children are having an increase in preference for sedentary playtime and a decrease in physical playtime (Hayden-Wade, Stein, Ghaderi, Saelens, & Zabinski, 2005; Johnston, 2004). Overweight children, in comparison to normal weight peers, are not only significantly more at risk for developing medical problems but may also be at higher risk for behavioral problems, specifically aggression (Banis et al., 1998; Bin, Hong-Bo, & Gang, 2005; Epstein, Klein, & Wisniewski, 1995). However, despite the fact some research has shown significant behavior differences in aggression between overweight children and non-overweight weight children, others find only significant differences between clinically overweight children (children receiving treatment at a pediatric clinic for obesity) and normal weight children (e.g., Braet, Mervielde, &

Vandereycken, 1997). In addition, overweight children may potentially display more aggression than normal weight peers due to other risk factors. One such risk factor is that overweight children tend to be more at risk for being socially rejected by peers which is also positively correlated with aggression (Hayden-Wade et al., 2005; Hodges & Perry, 1999; Ladd, 2006).

Aggression is a common behavioral problem occurring in both normal weight and overweight children. A large amount of research has been devoted to differences in aggression levels between boys and girls (e.g., Bjorkqvist, Lagerspetz, & Kaukiainen, 1992; Crick & Werner, 1999; Werner & Nixon, 2005), but not to differences in aggression levels specifically related to a child's Body Mass Index (BMI). The research that is currently available on aggression in overweight young children is very limited and sometimes stated as being nonexistent prior to adolescence (Vila et al., 2004).

Additionally, much of the current research combines children in early, middle, and late childhood into one sample. The inconsistencies found in the limited literature on the relationship between being overweight and behavior problems in younger children may be the result of studies using children with age ranges that span five years or more. The level of cognitive and social development in middle childhood is very different from those in the adolescent years and must be considered when examining differences between normal and overweight children (Vila et al., 2004). Even within the middle childhood range of 6-12 (as defined by Erikson, 1968), it is clear that developmentally a six year old who is transitioning out of middle childhood is very different than a 12 year who is entering early adolescence. It is also known that levels and types of aggression differ across childhood and adolescence (Bjorkqvist et al., 1992). It is thus imperative

when studying aggression to conduct studies in which such large age ranges are not present.

Overweight children may not only be at risk for having behavior disorders but physical problems as well. Overweight children and adults have been shown to have an increase in medical problems such as Type 2 diabetes, intracranial pressure, circulatory problems, and debilitating joint disease (National heart, Lung, and Blood institute, 1998; Fenning & Fenning, 2006). It has been supported that there is a relation between medical problems and depression and peer rejection in children (Sandstrom & Schanberg, 2004). Due to the importance of peer relationships and social acceptance during childhood, all factors that contribute to peer rejection should attempt to be addressed (Ladd, 1990). Obesity and its associated medical conditions could possibly be further contributing to the peer rejection and the possible increase in behavioral problems.

Children who are often identified as being bullies in schools are larger in size in comparison to their peers and tend to also be identified as being socially rejected (Nansel et al., 2001; Olweus, 1992). The literature on bullies seems to suggest that bullies and overweight children share similar characteristics in regards to being physically larger, socially rejected, and aggressive. Similarities between bullies and overweight children may help identify negative perceptions of overweight children, which may contribute to the overweight children's increased social rejection and aggressive behavior.

The unique contribution of the current study is that it was the first to examine the relationship between BMI and aggression in young children. Most previous research has focused on older children and adolescents with little emphasis on younger children (e.g., Vila et al., 2004) or has focused on clinical samples (e.g., Banis et al., 1998). The goal of

the proposed study was to determine how BMI is related to aggression in first grade children.

CHAPTER II

REVIEW OF LITERATURE

In this chapter, a brief general overview of the research on aggression is presented first. Within the discussion of aggression, relational aggression and overt aggression will be discussed as will gender differences. Next, the bullying literature will be reviewed. To fully understand obesity and its correlates, it is important to understand the social, behavioral and biological issues overweight children face, thus this literature will be reviewed next. Finally, the research on the effects of being overweight on social interactions will be reviewed. Specifically, behavior problems in overweight children will be examined followed by peer interaction and victimization.

Aggression

Gender and Aggression

Aggression is one of the most common behavior problems among children. A majority of children report being physically victimized, with 40-80% of the children reporting they have been physically victimized at least one time and 10-15% reporting chronic or repeated physical victimization (Juvonen & Graham, 2001 as cited by Sullivan, Farrell, & Kliewer, 2006). Hood et al. (1996) has shown that aggression can be salient in boys as early as the age of four years old. One of the basic findings related to gender differences is that boys tend to display more overt aggression or physical aggression, while girls tend to display more relational aggression or social aggression

(Crick, Casas, & Mosher, 1997; Crick & Werner, 1999). Relational aggression is the specific type of aggression that is intended to hurt victim's friendships or social groups. Physical aggression refers to the behaviors that harm or intend to harm others through physical force or the threat of physical force (Crick et al., 1995).

Relational aggression. Relational aggression has been researched mainly in the last decade as previous research focused on physical aggression (e.g., Coie & Dodge, 1998; Hood, 1996). Initially research on aggression was operationally defined to mean physical or direct verbal harm. This definition was greatly responsible for the initial findings that boys were more aggressive than girls. Later it was recognized that the traditional definition was too narrow and lacked the ability to measure other types of aggression such as relational and indirect aggression. With the understanding of other specific types of aggression and the development of measures for each specific type of aggression, it was found that boys were not always the more aggressive gender, but that girls were equally aggressive (Crick et. al., 1995). However, girls typically use relational rather than physical aggression (Crick et. al., 1995; Crick & Grotpeter, 1995). Additionally, girls report more often than boys that relational aggression is more harmful than other types of aggression (Crick et. al., 1995; Coyne, Archer, & Eslea, 2006).

Relational aggression can also be seen in boys during early childhood but it is not the primary form of aggression used, unlike in girls. As boys and girls become older and have more cognitive and social skills, the use of relational aggression begins to increase (Osterman, Bjorkqvist, & Lagerspetz, 1998). About the time puberty begins, social acceptance seems to become even more important to adolescents than it is to children. At the age of 11 relational aggression begins to peak, specifically as the primary form of

aggression in girls (Bjorkqvist et al., 1992). At this same age, boys also show an increase in the use of relational aggression more than when they were young. However, contrary to girls, boys will also continue to display physical aggression as well (Crick et al., 1995). The development of cognitive and language skills (Osterman et al., 1998) and the understanding of the importance of social acceptance with peers (Conyne et al., 2006) may be affecting the increase of relational aggression in both boys and girls.

Overt aggression. Crick et al. (1995) define overt aggression as aggression that results in physical pain to another (e.g., hitting, kicking, and pushing). Overt aggression is common in children from ages four to about eight and then begins to decrease as their cognitive and social skills begin to increase. Overt aggression is more common in boys across the lifespan than in girls (Crick et al., 1995), causing much of the early research to focus on boys exclusively.

Overt aggression and peer acceptance are correlated even in preschool (Sebanc, 2003; Snyder, Horsch, & Childs, 1997). For example, Snyder et al. (1997) found significant differences in overt aggression between socially rejected children and non-socially rejected children. Snyder and colleagues suggest that children in preschool who are not socially rejected and have friends are less overtly aggressive than children who do not have friends. The relation between overt aggression and peer acceptance at the preschool age level as suggested by Snyder and colleagues is very similar to older age levels as well (Howes, Hamilton, & Phillipsen, 1998, as cited by Sebanc, 2003). An interesting phenomenon is that preschool boys who display overt aggression are more likely to have fewer friends and be socially rejected than are girls who also show overt aggression (Wood, Cowan, & Baker, 2002). Poor social acceptance by peers for children

who display aggressive behaviors tend to be very similar to those who are classified as bullies, as discussed next.

Bullying. Nansel and colleagues (2001, p. 2094) have defined bullying as “a behavior that is intended to harm or disturb another person, repeatedly occurs, and has an imbalance of physical or psychological power.” There are two major types of bullying behavior, direct bullying and indirect bullying.

Direct Bullying. Direct bullying has three main components, physical, verbal, and subtle (Bjorkqvist et al., 1992; Rigby, 1996). Physical direct bullying is the actual hitting, kicking, or pushing of another child and is the most common form of bullying during the elementary years. Verbal direct bullying includes threats, cursing, and name-calling. Lastly, subtle direct bullying is identified as obscene gestures that can include facial expressions or eye rolling.

Olweus (1992) identified that there has to be some sort of an imbalance between victim and bully in direct bullying. One imbalance that must exist is a size imbalance between the bully and victim. Bullies often will have victims who are physically smaller than they are (i.e. a 5th grade child bullying a 1st grade child). Another imbalance Olweus identifies is that a strength imbalance must exist as well. If the victim is physically larger, the bully must in turn feel they are psychologically stronger (i.e. first grade child bullying a 5th grade handicapped child).

Indirect Bullying. Indirect bullying is involving others in the aggressive act. Indirect bullying also is comprised of three subcategories, physical, verbal, and subtle (Bjorkqvist et al., 1992; Rigby, 1996). An example of indirect physical bullying would be having someone else conduct the assault instead of personally conducting the assault. Indirect verbal bullying is gossiping about someone to convince someone else to insult

another person. Indirect subtle or non-verbal bullying is probably the most difficult to observe and is often manifested as social banishment (Brendtro, 2001), exclusion, or hiding personal belongings (Rigby, 1996). Indirect bullying is different from relational aggression as it is repeated and purposeful aggression that is designed to involve other peers.

Bullying and social rejection. Children who are bullies often share some of the same characteristics as those who they victimize. Children who are identified as bullies or victims often do not perform well in school, are rejected by peers, and are victims from larger and stronger bullies (Andreou, 2004; Mooij, 2005; Newman-Carlson & Horne, 2004; Olweus, 1992). Overall, bullying appears to be a negative behavior that is used to strengthen an individual's position (Mooij, 2005).

Children have many different ways they can behave aggressively. With the broader understanding of aggression, gender differences as well as physical differences related to aggression may become clearer. Children who score high in aggression all seem to have possible immediate and long-term effects in their social acceptance with peers. How social acceptance affects specific types of children, specifically overweight children, will be reviewed below.

Childhood Obesity

The increase in childhood obesity is a concern for not only Americans but for many cultures (Flegal, Carroll, Ogden, & Johnson, 2002; Ogden, 2006; Silventoinen, Sans, & Tolonen 2004). The rise in obesity is becoming a growing concern to all countries that are becoming more affluent (Flegal et al., 2002). At his recent American Psychological Society (APS) address, Brownell hypothesized that this increase in

affluence allows families to buy more and fattier food (APS Observer, August, 2006). A significant predictor that may be contributing to the increase in obesity is a more sedentary lifestyle (Hayden-Wade et al., 2005; Johnston, 2004). More children are filling their recreational time with activities such as video games and television instead of outside activities requiring more physical exercise. In a two-year time frame, there was an increase in the number of children ages 6-11 years old who were at-risk of becoming overweight or overweight from 32.6% in 2001 to 36.5% in 2003 (Ogden, 2006). Great Britain and China are two other countries that are showing increases in child obesity (Flegal et al., 2002, Silventoinen et al., 2004). The number of overweight children in Great Britain has tripled and China's overweight preschool population has increased from 1.5% to 12.6% in just eight years (Rennie & Jebb, 2005; Silventoinen et al., 2004). According to the Centers for Disease Control (2006), recent data shows that children ranging from 6-11 years of age and who are in the overweight category (95th BMI percentile in relation to other children of the same gender and age) have increased from 11% in 1988-94 to 19% in 2003-04.

In addition to the growing population of overweight children, there is an even greater risk for increased obesity in minority children ages 6-11 (Ogden, 2006). In the U.S., the highest rate of obesity in children is found in Mexican American boys while the lowest is found in Non Hispanic White girls (Hedley et al., 2004). These ethnic differences are of great concern as obesity has become the second leading cause of death in adults and is related to negative social interactions in adults and also in children (Romero, 2006). Some ethnic groups such as Native Americans are also more at risk for specific types of medical concerns in addition to being more at risk of being overweight

(Kibby, 2006). Since obesity risk factor to premature death and to the onset of some diseases, such as joint disease, heart disease, and strokes (CDC, 2006a), it is extremely important to address obesity in minority groups who may already have a predisposition to such medical concerns.

Children who are overweight have a significantly greater risk of being overweight as adults than do normal weight children (US Department of Health and Human Services, year as cited in Baskin, Ard, Franklin, & Allison, 2005). The increased risk of becoming overweight as adults causes a life long greater risk of medical problems such as diabetes, heart disease, obstructive sleep apnea, intracranial pressure, joint disease, and even a greater risk of dying at a premature age in comparison to those who are not overweight (Fennig & Fennig, 2006; Flegal, Graubard, Williamson, & Gail, 2005). Obesity tends to increase with age; so starting with a large overweight population at an early age may lead to a dramatic increase in obesity in the older adult populations who are already at a greater risk of medical problems (Flegal et al, 2005). In addition to obesity affecting physical health, it may also affect mental health in a variety of ways. One such way is that medical side effects of being overweight (e.g., shortness of breath, joint problems) may also influence a child to not participate in activities with peers and further influence the social isolation and peer rejection that overweight children may face, which is discussed below.

Obesity, Social Rejection, and Behavior Problems

There are several studies with participants ranging from 5-16 years old that show overweight children have more internalizing and externalizing behavioral problems than non-overweight children (Bin et al., 2005; Braet et al., 1997; Vila et al., 2004; Zeller,

Saelens, Roehrig, Krik, & Daniels, 2004). Specifically, Vila (2004) found that 25% of the overweight children reported external behavioral problems on the self-report Child Behavior Checklist (CBCL), which is significantly higher than the 11% reported by normal weight peers. Additionally, it was found that the overweight children reported more internalizing and externalizing behavior problems than their parents reported about their children. Bin et al. (2005) found similar evidence in Chinese children ages 6 – 11 years old that the rate of behavioral problems in overweight participants were significantly higher than normal weight participants with rates at 36.94% and 12.97% respectively. Interestingly, there was no significant gender difference between overweight boys and girls with the behavior problems rating at 40.38% for boys and 33.9% for girls ($p > .05$). Bin and colleagues further stated that aggression accounted for 9.62% of the variance in the behavioral problems in boys and 8.48% in girls. Several other studies whose participants ages ranged from 7 -16 years old also support similar findings that overweight children display significantly more externalizing behavioral problems such as aggression than do normal weight children (Banis et. al., 1998; Epstein et al., 1995; Stradmeijer et al., 2000; Yang et al., 2001). Other recent research also suggests that overweight children face social exclusion (Hayden-Wade et al, 2005) and victimization (Sabrina, 2006) from their peers, which are both correlated to increased aggression. It is unclear if aggression in overweight children is present prior to social exclusion or if the aggression is a coping technique developed by overweight children.

Exclusion by other children is a major issue faced by all children, as social inclusion appears to be one of the basic human needs. Five to six year old children reported in a study that social acceptance is one of the most important issues they face

(Ladd, 1990). These social interactions with peers are very important in developing positive self-esteem and social skills (Ladd, 1990). Some evidence from a longitudinal study following participants from the ages of 3 - 32 years of age has shown that social involvement in clubs, both intellectual and sporting, have a direct positive impact on self-concept and self-esteem in children (McGee, Williams, Howden-Chapman, Martin, & Kwachi, 2006). McGee et al. (2006) also discussed how active involvement of children in school activities is important. Children who are actively involved in after-school programs not only show a significant increase in self-concept and self-esteem, but also show a significant increase in social acceptance among peers (Mahoney, Lord, & Carryl, 2005; McGee et al., 2006). However, obese children tend to not participate in these types of activities, which may influence social rejection, self-esteem, and weight gain (Elkins, Cohen, Koralewicz, & Taylor, 2004).

One particular area that may be of concern for overweight children and the lack of positive social interactions is the development of negative coping skills due to the increased teasing in comparison to normal weight children (Hayden-Wade et al., 2005). Positive conflict resolution skills are required when dealing with the teasing that overweight children often face (Hodges & Perry, 1999). If aggression should become an overweight child's coping technique, then overweight children who find themselves already being socially rejected may begin to further influence their social rejection due to their aggressive actions (Ladd, 2006). Ladd (2006) showed supporting evidence that aggressive behavior in conjunction with peer rejection are significant predictors for psychological maladjustment in younger children. Since it is unclear if the aggression is present in overweight children prior to social exclusion, we need to further research

overweight children at specific ages and see if a child's weight is correlated to the amount of aggression they will display. Also, the current study will clarify if overweight children are more at risk for acting aggressively compared to normal weight children. This study will greatly contribute to the research on overweight children that is described by Vila et al. (2004) as being almost nonexistent.

Limitations of Previous Research

The previous research has many limitations. The first is the lack of research specifically in young overweight children and their aggressive behavior. Past research, which has participants ranging from 6-12 years of age, may promote inconsistent data across studies. Several studies used participants that were across the entire middle childhood developmental age span. This could be of concern because children who are twelve and entering early adolescence are more cognitively and socially developed and should have learned better coping techniques than those who are six and just entering middle childhood. The large age span makes it difficult to know how aggression will be specifically affected by young children's BMI.

Another limitation is that many of the studies cited for social and behavioral problems in overweight children were conducted in other countries. The cultural difference in the participants may be very different than in the United States. These cultural differences may affect how BMI and aggression are related in the U.S.

The final limitation is due to the limited literature, specifically on aggression for young overweight children. Previous research shows some categorical differences on aggression between the overweight and normal weight children, but does not look at how aggression may linearly increase across BMI. Understanding the relationship of a child's

BMI and their aggressive behavior is important, as it will examine other influences on aggressive behavior. This research will help clarify as to how a child's body size in relation to other children of the same age and gender is related to aggression.

The Current Study

The primary purpose of the current study was to determine how BMI is related to aggression. Two research questions addressed gender differences and type of aggression differences. The proposed study will clarify existing research and allow future research to develop a more complete aggression model for the young overweight population.

Hypothesis

The relation between BMI and aggression is a positive linear relationship. Specifically, as a child's BMI increases, so will aggression. This hypothesis is based on the premise that children would become more aggressive as they become at-risk for overweight and overweight. This hypothesis is further supported by previous literature that identifies overweight children at multiple age ranges as having a greater risk in displaying aggressive behavior compared to their normal weight peers.

Research Question One

It is unknown if the relationship between BMI and aggression will be the same for boys as for girls, thus this question was explored in the current study.

Research Question Two

The relation between BMI and aggression is further clarified by breaking the global aggression scores down into physical, verbal, and bullying aggression. The relation may more clearly identify specific types of aggression that is influenced by BMI in this first grade sample.

CHAPTER III

METHODOLOGY

Participants

Archival data from the 2005 Families and Schools for Health (FiSH) project, Research Grant #2004-05545 from the United States Department of Agriculture at Oklahoma State University was used for the study. Amanda Harrist, Ph.D. was the primary investigator for the FiSH project and has granted permission for the use of this archival data for the present study. The archival data had a total of 608 first grade children who were enrolled in rural schools in Oklahoma that participated in the FiSH project. The mean age of the first grade participants was 6.85 ($SD = .437$, range = 5-8). The sample was primarily Caucasian 73.7%, Native American 17.5%, African American 2.6%, Hispanic 2.6%, Asian .3%, and multiple ethnic identity 3.1% . The child participant's teacher and a sub-sample of 240 parents also participated by filling out questionnaires and demographic forms that are listed below. Appendix A lists the participants' schools' demographic information, including number of students enrolled, number enrolled in first grade, number of reduced and free lunches, and ethnic populations in each school.

Measures

Demographic Information. Demographic forms were given to the school secretary and to the children's parents. The parent form requested information about the age, ethnicity, and tribal affiliation if the participant was Native American. The parent demographic forms were mailed back to the Families and Schools for Health (FiSH)

office located at Oklahoma State University by the child's parents along with the parent questionnaire. See Appendix A for each school's public demographic information.

Body Mass Index. Body Mass Index (BMI) was used to measure how overweight a child was in relation to their peers - identified by their age and sex and ratioing the child's height and weight. The recognized level for being at-risk of overweight is a child between the 85th and 94th percentile and overweight is a BMI equal to or greater than the 95th percentile (CDC, 2006a). The height and weight of the child participants were taken during the child's physical education class. A measuring board was used for all participants and height was measured in centimeters to the nearest tenth. Weight was measured in pounds to the nearest hundredth using an electronic scale that was zeroed before the participants were weighed. The formula used to determine a child's BMI is also referred to as the BMI-for-age and is the child's weight (kg) / child height² (m²).

$$\text{BMI} = (\text{kg}) / (\text{m}^2)$$

The child's gender, birth date, height, weight, and the date of measurement were entered into the Epi Info program to calculate their BMI percentile (CDC, 2006c).

Behavior Assessment System for Children, Second Edition. The Behavior Assessment System for Children, Second Edition (BASC-2) was used to assess children's behavior ranging from the ages of 2-25 (Reynolds & Kamphaus, 2004). The BASC-2 is the revised version of the BASC (Reynolds & Kamphaus, 1992). The Teacher Rating Scales (TRS) and the Parent Rating Scales (PRS) were used in the current study. The BASC-2 consists of 15 subscales. Each of the subscales can be used individually (Reynolds & Kamphaus, 2004). The scale used in this study was the aggression primary scale and the critical items identified in the scale. The BASC-2 has an overall high

reliability with an alpha coefficient of .88 (Reynolds & Kamphaus, 2004). A factor analysis indicated moderate to high loadings among components and scales, indicating good validity (Reynolds & Kamphaus, 2004). The present study had an alpha coefficient of .941 for the Teacher Rating Scale and an alpha coefficient of .859 for the Parent Rating Scale. The aggression scale is comprised of bullying, physical, verbal, temper, argumentative, and confrontational domains. Due to copyright rules the measure cannot be put into an appendix.

Procedure

Permission to collect data from students was first obtained from each school's superintendent, then each school principle, and then from individual classroom teachers. Participants were recruited during the summer and fall of 2005. Parental consent was obtained while recruiting at each school. Parents were also given the opportunity to mail their consent form in a preaddressed and stamped envelope. The teachers also sent consent forms home and were paid \$1.00 for each consent form returned. Child assent was given prior to collecting any child data

Participants were weighed and measured during the fall semester of 2005. A measuring board was used to measure the height of the child to the nearest tenth of a centimeter. Two research assistants were required to weigh and measure participants, one to measure, and the other to record. Two measurements were taken with both measurements required to be no more than .5 centimeters in difference. The average of the heights was accepted as the height of the participant. Participants were weighed on an electronic scale measuring to the nearest tenth; the scale was zeroed prior to the participants being weighed.

The child's aggression and bullying scores were obtained from the child participant's teacher and a sub-sample of the child participant's parents. The teacher assessments were handed out after school had been in session for about 7-9 weeks to ensure that teachers had time to observe the students and how they interacted. The parent forms were also mailed out during the same time frame. However, some of the parent forms were received much later in the semester. Both the teachers and parents were compensated for their time with money for each of the questionnaires completed and received. Teachers were given \$6.50 per survey and the parents were given \$15.00.

CHAPTER IV

FINDINGS

The main focus of this study was to examine how children's BMI, or weight status, was related to children's aggression as perceived by both parents and teachers. Linear regression and analysis of variance (ANOVA) were conducted for the main hypothesis and for two research questions. For the main hypothesis, since there was two separate aggression-rating scales (Teacher and Parent version), two separate regression and analysis of variance (ANOVA) analyses were used to analyze the data. The criterion for each regression was the Teacher Rating Aggression Scale and the Parent Rating Aggression Scale, with BMI as the predictor. For the ANOVA analyses the child's weight classification (normal weight, at-risk for overweight, and overweight) was the fixed factor and the previous aggression scales were the dependent variables. It was expected that the higher the BMI, the greater the aggression rating would be, indicating a positive relationship for both analyses. The ANOVA allowed us to further understand any differences between weight groups and it was expected that the at-risk for overweight and the overweight groups would be significantly different from the normal weight group. It was expected that the differences between the groups would show an increase in aggression scores for the at-risk for overweight and the overweight group compared to the normal weight group.

The means and standard deviations for each of the variables of interest are included in Table 1. The criteria for determining participants' group as being "normal weight", "at-risk for overweight", and for "overweight", were the same standards as defined by the CDC. The specific BMI criteria for each of the three groups was defined by the child's BMI; normal weight children was a BMI below the 85th percentile, at-risk for overweight was a BMI that was between the 85th and 95th percentiles, and overweight was a BMI that was in the 95th percentile or greater. Table 2 provides a summary for the number of normal weight, at-risk for overweight, and overweight children across genders.

Table 1.

Aggression Means and Standard Deviations by Weight Classification

	<i>Teacher Scale</i>			<i>Parent Scale</i>		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Normal Weight	13.9	5.5	389	17.0	4.1	185
At-Risk						
Overweight	14.5	5.2	95	17.1	3.8	24
Overweight	14.1	5.5	89	17.4	4.1	29

Note: Normal weight = BMI between 0 and 85th percentile; At-Risk Overweight = range between 85th and 95th percentile;

Overweight = BMI between 95th and 100th percentile.

Table 2.

Aggression Means, Standard Deviations, and Weight Classification by Gender

	<i>Teacher Scale</i>									<i>Parent Scale</i>								
	Normal weight			At-Risk Overweight			Overweight			Normal Weight			At-Risk Overweight			Overweight		
	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>
Boys	14.6	5.8	202	15.5	6.0	46	14.7	5.5	56	16.8	4.1	102	18.2	2.8	14	17.9	4.5	20
Girls	13.1	5.0	187	13.5	4.2	49	13.0	5.3	33	17.2	4.1	83	15.4	4.8	10	16.4	3.4	9

Note: Normal weight = BMI between 0 and 85th percentile; At-Risk Overweight = range between 85th and 95th percentile;

Overweight = BMI between 95th and 100th percentile.

Preliminary Analyses

A One-way ANOVA analyzed differences in aggression between participants' ethnic groups (5 levels; African American, Native American, Hispanic, Asian, and Caucasian). This analysis was conducted to identify if any significant differences on the main variable of interest (aggression) was present. There were no significant differences between teacher rating aggression scores as a result of ethnicity, $p > .05$.

Hypothesis: Teacher and Parent overall ratings on BASC-II BASC-II Teacher Aggression Rating Scale

Linear regression analysis revealed that BMI was not a significant predictor for the teacher rated aggression scale (TRAS) $F(1, 571) = 1.89, p = .16, r^2 = .003$. The main hypothesis suggesting higher BMIs would be correlated with higher aggression ratings was not supported for teacher ratings.

Further, the ANOVA showed no significant differences for the mean teacher ratings of aggression between any of the weight groups, $p > .05$. Since there were no significant differences between the three groups, the main hypothesis was not supported.

BASC-II Parent Aggression Rating Scale

Linear regression analysis showed that BMI was not a significant predictor for the parent rated aggression scale (PRAS) $F(1, 247) = .74, p = .39, r^2 = .003$. The main hypothesis suggesting BMIs would be correlated with aggression ratings was not supported for parent ratings.

In addition, the ANOVA with the total parent aggression score as a function of weight group showed no significant differences in parent ratings of aggression (PRAS) between the overweight group, at-risk for overweight group, and the normal weight group, $p > .05$; therefore, the main hypothesis was not supported.

Research Question 1

The purpose of research question one was to test if gender was a moderator for the relation between BMI and aggression. A linear regression analyzed BMI, gender, and the interaction term (gender by BMI centered) as the predictors and the teacher aggression score as the criterion. The predictor variables in the regression model were entered in the previous respective order for the regression model. The overall model had a significant effect, $F(3, 569) = 4.50, p = .004, r^2 = .02$. The main effect for BMI was not significant $p = .30$. However, the main effect for gender was significant $p = .001$. The gender main effect indicated that boys were rated higher than girls on the aggression scale. The interaction term was also not significant $p = .75$, indicating that gender does not moderate the relationship between BMI and aggression. Table 3 provides the ANOVA F score and t scores for the main effects and interaction term.

Table 3

Summary of the overall model, main effects, and interaction term using the BASC-II Teacher Rating Scale (N = 573)

Model	F	t	p
Overall Model	4.51		.004
BMI		1.03	.30
Gender		3.39	.001
Gender/BMI Centered		-.32	.74

Note: Teacher Rating Aggression Scale (TRAS) is the criterion; Predictor Body Mass Index (BMI) is equal to the weight in kilograms divided by height in meters squared, Gender/BMI Centered is equal to the child's BMI score minus the mean BMI then multiplied by the 0 for girls and 1 for boys.

Research Question 2

The purpose of research question two was to clarify if BMI or the child's weight classification was specifically related to bullying, physical, and/or verbal aggression; there are no items on the BASC-II that assess relational aggression, thus this part of the research question could not be tested. Simple regressions and ANOVAs were used to analyze each of the critical items. For both the Teacher and Parent versions, the critical items measured were the items for bully others (BCI), hits others (HCI), and threatens others (TCI). These items are located within the general BASC-II aggression scale and are identical for both the teacher and parent versions.

BASC-II Teacher Aggression Rating Scale

Bully behavior. Results of the linear regression analysis showed that BMI was a significant predictor for the teacher version bullying aggression critical item (TBCI), "Bullies Others", $F(1, 584) = 8.39, p = .004, r^2 = .015$, see Table 4. The amount of variance in aggression uniquely accounted for by BMI was 1.5%. This result suggests that BMI is significantly related to children's bullying aggression.

Table 4

Summary of Linear Regression Analysis for the main hypothesis using the BASC-II Teacher Rating Scales and Critical Items, BMI was the predictor variable

Criterion Variable	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>r</i> ²
TBCI	.0028	.010	2.89	.004**	.015**
THCI	.0006	.009	0.66	.50	.001
TTCI	.0011	.008	1.43	.15	.004

Note: Teacher Bully Critical Item (TBCI); Teacher Hitting Others Critical Item (THCI); Teacher Threatens Critical Item (TTCI); Predictor Body Mass Index (BMI) is equal to the weight in kilograms divided by height in meters squared. ** $p < .01$

An ANOVA with weight group (3 levels; overweight, at-risk for overweight, and the normal weight) as the independent variable also showed significant differences on the Teacher Bullying Critical Item (TBCI), $F(2, 583) = 1.64$, $p = .032$, see Table 5. A Tukey post hoc test indicated significant differences between the at-risk for overweight group and the normal weight group, $p = .03$. It is important to note that the overweight group did not score significantly different from the at-risk for overweight group or the normal weight group. Overall, both the linear regression and the one-way ANOVA analyses in question two were significant, which suggests BMI is specifically related to bullying as reported by teachers.

Table 5

Summary of ANOVA for the main hypothesis using the BASC-II Teacher Rating Scales and Critical Items by children's weight classification

Dependent Variable	<i>F</i>	<i>p</i>	<i>df Between</i>	<i>df Within</i>
TBCI	3.46*	.03	2	583
THCI	.46	.63	2	582
TTCI	.17	.85	2	580

Note: Teacher Bully Critical Item (TBCI); Teacher Hitting Others Critical Item (THCI); Teacher Threatens Others Critical Item (TTCI); Predictor Body Mass Index (BMI) is equal to the weight in kilograms divided by height in meters squared. * $p < .05$

Physical aggression. For the teacher version physical aggression critical item (THCI), “Hits other children”, BMI was not a significant predictor of this form of aggression, $F(1, 583) = .44$, $p = .51$, $r^2 = .001$, see Table 4. Research question two did not identify a relationship between BMI and the HCI item.

The ANOVA also indicated there was no effect of weight group on HCI, $F(2, 582) = .46$, $p = .63$, see Table 5. This ANOVA suggests that according to teachers, the at-risk for overweight and the overweight children do not tend to hit other children more than normal weight children.

Verbal aggression. For the verbal aggression critical item (TTCI), “Threatens to hurt others”, BMI was not a significant predictor, $F(1, 581) = 2.05$, $p = .15$, $r^2 = .004$, see Table 4. Research question two did not identify a relationship between BMI and the TTCI item.

The ANOVA also indicated there was no effect of TCI, $F(2, 580) = .17$, $p = .85$, see Table 5. This ANOVA suggests that according to teachers, the at-risk for overweight

and the overweight groups do not tend to threaten others more than normal weight children.

BASC-II Parent Aggression Rating Scale

Bullying aggression. For the parent version bullying critical item (PBCI), “bullies others”, BMI was not significant for the linear regression, $F(1, 236) = .03, p = .85, r^2 < .001$, see Table 6 BMI was not a significant predictor of bullying. Research question two did not identify a relationship between BMI and the PBCI item.

Table 6

Summary of Linear Regression Analysis for the hypothesis using the BASC-II Teacher Rating Scales and Critical Items, BMI was the predictor variable

Criterion Variable	<i>b</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>r</i> ²
PBCI	.0002	.011	.19	.85	.001
PHCI	.0022	.012	1.89	.06	.01
PTCI	.00039	.009	-.43	.67	.001

Note: Parent Bully Critical Item (PBCI); Parent Hitting Others Critical Item (PHCI); Parent Threatens Others (PTCI); Predictor Body Mass Index (BMI) is equal to the weight in kilograms divided by height in meters squared.

The ANOVA also indicated there were no effect of weight group on PBCI, $F(2, 246) = 1.15, p = .22$, see Table 7. This ANOVA suggests that according to parents, the at-risk for overweight and the overweight children do not tend to display more bullying than normal weight children.

Table 7

Summary of ANOVA for the main hypothesis using the BASC-II Parent Rating Scale and Critical Items by children's weight group

Dependent Variable	<i>F</i>	<i>p</i>	<i>df Between</i>	<i>df Within</i>
PBCI	1.15	.32	2	246
PHCI	1.78	.17	2	247
PTCI	.17	.85	2	247

Note: Parent Bully Critical Item (PBCI); Parent Hitting Others Critical Item (PHCI); Parent Threatens Others (PTCI); Predictor Body Mass Index (BMI) is equal to the weight in kilograms divided by height in meters squared.

Physical aggression. For the parent version physical aggression critical item (PHCI), “Hits other children”, BMI was not a significant predictor aggression, $F(1, 236) = 3.55, p = .06, r^2 = .01$, see Table 6. Research question two did not identify a relationship between BMI and the PHCI item.

The ANOVA also indicated there was no effect of PHCI, $F(2, 247) = 1.78, p = .17$, see Table 7. This ANOVA suggests that according to parents, the at-risk for overweight and the overweight children do not tend to display more physical aggression than normal weight children.

Verbal aggression. For the verbal aggression critical item (PTCI), “Threatens to hurt others”, BMI was not a significant predictor, $F(1, 236) = .19, p = .67, r^2 = .001$, see Table 6. Research question two did not identify a relationship between BMI and the PTCI item.

The ANOVA also indicated there was no effect of PTCI, $F(2, 247) = .17, p = .85$, see Table 7. This ANOVA suggests that, according to parents the at-risk for overweight

and the overweight groups do not tend to display more verbal aggression than normal weight children.

CHAPTER V

Discussion

The purpose of the current study was to identify the relationship between obesity and aggression in first grade children. Specifically, it was hypothesized that as children's body mass index (BMI) increases that the level of aggression would also increase, indicating a positive relationship. Both the linear regression and ANOVA analyses did not find a significant effect. Therefore, the main research hypothesis was not supported by the present study. The data suggested that at this age overweight children do not generally display more aggression than normal weight children. These findings, that no significant differences are present between overweight children who are not seeking treatment for obesity and normal weight children, are similar to that of Braet and colleagues (1997).

There are several reasons that may be contributing to the non-significant findings for the research hypothesis. Previous studies that identified significant differences between the overweight and normal weight groups were often conducted in other countries (Bin et al., 2005; Stradmeijer et al., 2000; & Yang, 2001). Cultural differences may be contributing to the non-significant finding from the current sample. Also, many previous studies that found significant differences in overweight children included children whose ages ranged several years apart (Bin et al., 2005; Braet et al., 1997; Vila et al. 2004; Zeller, Saelens, Roehrig, Krik, & Daniels, 2004). The age of the children from the current study may also be influencing the results. Finally, obesity in young

children can be hard to visibly identify. As the children grow older and become more noticeably overweight, the ratings of their aggressive behaviors may change as well.

The overweight and at-risk for overweight groups in the study were both very small. Having a larger overweight population may help clarify if the overweight group is truly significantly different from the normal weight group or the at-risk group. Due to the small sample size the data show that the overweight group is not different from either group and should be further researched.

A research hypothesis was proposed suggesting that gender might act as a moderator in the aggression and BMI relationship. Specifically, the proposed hypothesis was to examine the interaction of gender and BMI. This interaction term for gender with BMI centered was also not significant. The non-significant interaction suggests the BMI and aggression relationship is the same for both genders. A main effect of gender was present which suggested the data was consistent with previous literature in that boys tend to score higher in aggression than girls (Bjorkqvist et al., 1992).

A second research hypothesis was also proposed to examine the relation between BMI and three specific types of aggression: bullying, physical and verbal. It was expected that overweight children would display significantly more aggression for all three types of aggression. However, the only significant effect of BMI occurred with teacher reported bullying. The data indicated the at-risk for overweight group scored the highest for bullying behavior.

The effect of BMI on bullying behavior is important; as the research that is currently available on aggression in overweight young children is very limited and sometimes stated as being nonexistent prior to adolescence (Vila et al., 2004). The

current data suggests that although the children who have a larger BMI may not appear to hit other children more often, they are still perceived to be more apt to bully other children. This would suggest that when children become larger to a certain point and act aggressively, they are perceived to be doing so purposefully. The fact that larger children are perceived as bullies when they display aggression could increase the children's level of social rejection due to the negative correlation between bullying and social acceptance (Andreou, 2004; Mooij, 2005).

The fact that the larger BMI children scored higher in bullying behavior may also be contributing to their level of social rejection despite how much they are liked or disliked by their peers (Baldry, 2004). Although we may not be certain if aggression comes before social rejection or visa versa, the present study has given some supporting evidence that larger children are more prone to be rated higher in bullying than other children. This is an important negative perception, that may suggest a prejudice against large kids and needs to be addressed. By addressing this negative perception we may be able to encourage more positive coping techniques in at-risk for overweight children. These positive coping techniques can greatly contribute to greater social skills and social acceptance by their normal weight peers (Ladd, 1990; Mahoney, Lord, & Carryl, 2005; McGee et al., 2006).

BMI's relation to bullying behavior is important. This finding seems to target one of the possibly many different negative perceptions at-risk for overweight children face. It appears that even though they do not act generally more aggressive than other children their aggressive behavior is more harshly perceived as intentional and repeated by authority figures. This may be a major factor in understanding why overweight children

suffer with social relationships. The perception of bullying behavior needs to be further researched to understand how it specifically affects social ratings from peers.

Limitations of the Study

A major methodological issue in this study was the perception of the items listed in the BASC-II. Although they were direct, some of the items could still be subjectively understood. When the teachers or parents were presented with the item “Bullies others”, one could perceive this question as any type of bullying behavior. To say that these data suggest that the larger children physically bully other children is not possible until we know how each of the teachers perceived bullying. Another example of this is the item “threatens to hurt others,” which could be perceived in two different aspects: to physically hurt others or to verbally hurt another child’s social standing. Despite how direct the measures appear to be, subjective understanding of the items might still be affecting the data.

Another methodological issue is that the study lacked assessments of peer perceptions. All of the measures were self-report measures from authority figures that are often not the victim of the aggressive behaviors being reported. The inclusion of peer’s perception of children’s aggressive behavior would help solidify the results of this study.

Future studies should be conducted to help confirm the relationship between BMI and bullying behavior. Longitudinal research could also help clarify how children’s BMI or weight classifications predicatively affect the development of aggressive behaviors. Since the children who participated in the present study are in first grade, they are still

developing their physical identity. Continued research on obesity and aggression can help researchers draw more firm conclusions.

Future Directions

The proposed research has helped clarify some of the inconsistencies in the literature on overweight children and aggression. It is important to further understand specific issues related to aggression and child obesity. The findings that the at-risk for overweight and overweight groups are not significantly different should further be examined. Specifically, how both groups are perceived to bully others more often should be further examined. Peer nominations could help clarify if larger children are perceived to be bullies more often than normal weight children. Future research could also examine the relationship of bullying on children's BMI and a high score on negative social adjustment. Those who are larger in size and have a negative social adjustment may be more at risk for the development of aggression disorders and identification of these factors could prevent such behaviors from developing.

Further studies could clarify what specific type of bullying behavior is exactly related to obesity. Measures that are designed to be more sensitive to specific types of bullying behavior could be used to clarify what type of bullying larger children display. These findings could be critical in understanding social interactions for overweight children. Once the bullying behavior can be identified, interventions designed to address these negative behaviors can be developed to better influence the child's social relations.

Conclusion

The purpose of this study was to examine the relation between BMI and aggression. Consistent with Braet and colleagues (1997), the present study revealed that

the overall level of aggression in young children is very similar across body size. The participants were not seeking treatment for obesity and the overweight children did not tend to generally show more aggression. However, aggressive disorders such as bullying behavior indicate a greater risk of being related to children with larger BMI from authority figures. The increased risk of being perceived as a bully should be taken into account when examining the aggressive tendencies for overweight children and for the development of aggression and social interventions. The relation between BMI and social adjustment with bullying behaviors should further be examined to more clearly identify those who are at risk in developing aggressive disorders. Better psychological treatments for at-risk for overweight and overweight children may be developed by clearly identifying the population who is most at risk for aggressive disorders. These future research topics further our understanding of overweight children. The new research will help shape interventions that will allow us to better develop social skills and social acceptance in overweight children from their normal weight peers.

REFERENCES

- Achenbach, T., & Edelbrock, C. (1981). Behavioral problems and competencies reported by parents of normal and disturbed children aged four through sixteen. *Monographs of the Society for Research in Child Development*, 46, 1-82.
- Aiken, L., & West, S. (1991). *Multiple regression: Testing and interpreting interactions*. Thousand Oaks, CA: Sage Publications.
- Andreou, E. (2004). Bully/victim problems and their association with Machiavellianism and self-efficacy in Greek primary school children. *British Journal of Educational Psychology*, 74, 297-309.
- Baldry, A. C. (2004). What about bullying?' An experimental field study to understand students' attitudes towards bullying in Italian middle schools. *British Journal of Educational Psychology*, 74, 583-598.
- Banis, H., Varni, J., Wallander, J., Korsch, B., Jay, S., Adler, R., Temple, E., & Negrete, V. (1998). Psychological and social adjustment of obese children and their families. *Child Care, Health and Development*, 14, 157-173.
- Baskin, M. L., Ard, J., Franklin, F., & Allison, D.B. (2005). Prevalence of obesity in the United States. *Obesity Reviews*, 6, 5-7.
- Bin, W., Hong-Bo, Z., & Gang, X. (2005). Survey on the behavioral problems in children with obesity from 6 to 11 years old [Abstract]. *Chinese Mental Health Journal*, 19, 679-681.

- Bjorkqvist, K., Lagerspetz, K., & Kaukiainen, A. (1992). Do girls manipulate and boys fight? Developmental trends in regard to direct and indirect aggression. *Aggressive Behavior*, 18, 117-127.
- Braet, C., & Ipema, J. (1997). Conflicts in adolescence. Is there a relationship between emotional eating and emotional instability in obese youngsters? *International Journal of Adolescent Medicine & Health*, 9, 123-133.
- Braet, C., Mervielde, I., & Vandereycken, W. (1997). Psychological aspects of childhood obesity; a controlled study in a clinical and nonclinical sample. *Journal of Pediatric Psychology*, 22, 59-71.
- Brendtro, L. K. (2001, Summer). Worse than sticks and stones: Lessons from research on ridicule. *The Newsletter of Educators for Social Responsibility*, 18(2), 5-6, 9.
- Brownell, K. (2006, August). Eating into the nation's obesity epidemic. *APS Observer*, 19, 38-41.
- Carey, T. A., & Bourbon, W. T. (2005). Countercontrol: What do children say? *School Psychology International*, 26, 595-615.
- Center for Disease Control and Prevention (2006a). BMI-body mass index: About BMI for children and teens. Retrieved November 6th, 2006
http://www.cdc.gov/nccdphp/dnpa/bmi/childrens_BMI/about_childrens_BMI.htm
- Center for Disease Control and Prevention (2006b). Prevalence of overweight among children and adolescents: United States, 2003-2004. Retrieved November 6th, 2006
http://www.cdc.gov/nchs/products/pubs/pubd/hestats/obese03_04/overwght_child_03.htm
- Center for Disease Control and Prevention (2006c). *Epi Info*. Retrieved Dec 15, 2006 from <http://www.cdc.gov/epiinfo>.

- Cohen, J., Cohen, P., West, S., & Aiken, L. (2003). Applied multiple regression/correlation analysis for the behavioral sciences. Mahwah, NJ: Lawrence Erlbaum Associates Publishers.
- Coie, J., & Dodge, K. (1998). Aggression and antisocial behavior. In W. Damon (Series Ed.) & N. Eisenberg (Vol. Ed.), *Handbook of child psychology* (5th ed., pp.779-862). Hoboken, NJ: John Wiley & Sons.
- Concle, A. (2006, August). Eating into the nation's obesity epidemic. *Observer*, 19, Retrieved November 27, 2006 from http://www.psychologicalscience.org/observer/archive/aps_ObserverSearch.cfm
- Coyne, S., Archer, J., & Eslea, M. (2006). We're not friends anymore! Unless... The frequency and harmfulness of indirect, relational, and social aggression. *Aggressive Behavior*, 32, 294-307.
- Crick, N., Casas, J., & Mosher, M. (1997). Relational and overt aggression in preschool. *Developmental Psychology*, 33, 579-588.
- Crick, N., & Grotpeter J. (1995). Relational aggression, gender, and social-psychological adjustment. *Child Development*, 66, 710-722
- Crick, N., & Werner, N. (1999). Response decision processes in relational and overt aggression. *Child Development*, 69, 1630-1639.
- Dishion, T., Andrews, D., & Crosby, L. (1995). Antisocial boys and their friends in early adolescence: Relationship characteristics, quality, and interactional process. *Child Development*, 66, 139-151.

- Ekins, W., Cohen, D., Koralewicz, L., & Taylor, S. (2004). After school activities, overweight, and obesity among inner city youth. *Journal of Adolescence*, 27, 181-189.
- Epstein, L.H., Klein, K.R., & Wisniewski, L. (1995). Child and parent factors that influence psychological problems in obese children. *International Journal of Eating Disorders*, 15, 151-158.
- Erikson, E. (1968). *Childhood and society*. New York: Norton.
- Fenning, S., & Fenning, S. (2006). Intensive therapy for severe pediatric morbid obesity. *European Eating Disorders Review*, 14, 118-124.
- Flegal, K., Carroll, M., Ogden, C., & Johnson, C. (2002). Prevalence and trends in obesity among US adults. *Journal of American Medical Association*, 288, 1723-1727.
- Flegal, K., Graubard, B., & Gail, M. (2005). Excess deaths associated with underweight, overweight, and obesity. *Journal of the American Medical Association*, 293, 1861-867.
- Harrist, A., & Bradley K., (2002). Social exclusion in the classroom: Teachers and students as agents of change. In J. Aronson (Ed.), *Improving academic achievement: Impact of psychological factors on education* (pp. 363-383). San Diego, CA: Academic Press.
- Hayden-Wade, H., Stein, R., Shaderi, A., Saelens, B., & Zabinski, M. (2005). Prevalence, characteristics, and correlates of teasing experiences among overweight children vs. non-overweight peers. *Obesity Research*, 13, 1381-1392.

- Hedley, A., Ogden, C., Johnson, C., Carroll, M., Curtin, L., & Flegal, K. (2004). Prevalence of overweight and obesity among US children, adolescents, and adults, 1999-2002. *Journal of American Medical Association*, 291, 2847-2850.
- Hodges, E., & Perry, D. (1999). Personal and interpersonal antecedents and consequences of victimization by peers. *Journal of Personality and Social Psychology*, 76, 677-685.
- Hood, K. (1996). Intractable tangles of sex and gender in women's aggressive development: An optimistic view. In D. M. Stoff & R. B. Cairns (Eds.), *Aggression and violence: Genetic, neurobiological, and biosocial perspectives* (pp. 309-335). Mahwah, NJ: Lawrence Erlbaum.
- Johnston, J. M. (2004). Eating disorders and childhood obesity: Who are the real gluttons? *Canadian Medical Association Journal*, 171, 1459-1460.
- Juvonen, J., & Graham, S. (2001). Peer harassment in school: The plight of the vulnerable and victimized. New York: Guilford Press
- Ladd, G. W. (2006). Peer rejection, aggressive or withdrawn behavior, and psychological maladjustment from ages 5 to 12: An examination of four predictive models. *Child Development*, 77, 822-846.
- Ladd, G. W. (1990). Having friends, keeping friends, making friends, and being liked by peers in the classroom: Predictors of children's early school adjustment? *Child Development*, 61, 1081-1100.
- Lowenstein, L. F. (1978). Who is the bully? *Bulletin of British Psychological Society*, 31, 147-149.
- Mahoney, J., Loard, H., & Carryl, E. (2005). Afterschool program participation and the development of child obesity and peer acceptance. *Applied Developmental Science*,

9, 202-215.

McGee, R., Williams, S., Howden-Chapman, P., Martin, J., & Kawachi, I. (2006).

Participation in clubs and groups from childhood to adolescence and its effects on attachment and self-esteem. *Journal of Adolescence*, 29, 1-17.

Mooij, T. (2005). National campaign effects on secondary pupils' bullying and violence.

British Journal of Educational Psychology, 75, 489-511.

Nansel, T. R., Overpeck, M., Pilla, R. S., Ruan, W. J., Simons-Morton, B., & Scheidt, P.

(2001). Bullying behaviors among US youth: Prevalence and association with psychosocial adjustment. *Journal of the American Medical Association*, 285, 2094-2100.

National Heart, Lung and Blood Institute. Hyperuricemia in a child: A complication of treatment of obesity. *Pediatrics*, 54, 370-371.

Newman-Carlson, D., & Horne, A. (2004). Bully busters: A psychoeducational

intervention for reducing bullying behavior in middle school students. *Journal of Counseling and Development*, 82, 259-267

Olweus, D. (1992). *Victimization among schoolchildren: Intervention and prevention*. In

G. W. Albee, L. A. Bond, & T.V Monsey (Eds.), *Improving children's lives: Global perspectives on prevention* (pp. 279-295). Thousand Oaks, CA: Sage Publications.

Ogden, C. (2006). Prevalence of overweight and obesity in the United States, 1999-2004.

Journal of the American Medical Association, 295, 1549-1555.

Osterman, K., Bjorkqvist, K., & Lagerspetz, K. (1998). Cross-cultural evidence of female indirect aggression. *Aggressive Behavior*, 24, 1-8.

- Peets, K., & Kikas, E. (2006). Aggressive strategies and victimization during adolescence: Grade and gender differences, and cross-informant agreement. *Aggressive Behavior, 32*, 69-79.
- Rennie, K. L., & Jebb, S. A. (2005). Prevalence of obesity in Great Britain. *Obesity Reviews, 6*, 11-12.
- Reynolds, C., & Kamphaus, R. (2004). Behavior assessment system for children (2nd ed.). New York: Pearson Assessments.
- Reynolds, C., & Kamphaus, R. (1992). Behavior assessment system for children (1st ed.). New York: Pearson Assessments.
- Rigby, K. (1996). *Bullying in schools: And what to do about it*. London, England: Jessica Kingsley Publishers.
- Rigby, K. (1997). Attitudes and beliefs about bullying among Australian children. *Irish Journal of Psychology, 18*, 202-220.
- Rigby, K., & Slee, P. T. (1991). Bullying among Australian school children: Reported behavior and attitudes toward victims. *Journal of Social Psychology, 131*, 615-627.
- Robert, J. (2001). Public health strategies for obesity treatment and prevention. *American Journal of Health Behavior, 25*, 252-260.
- Romero, M. G. (2006). Obesity as a disability: Medical, psychosocial and vocational implications. *Journal of Applied Rehabilitation Counseling, 37*, 21-29.
- Rusby, J. C., Forrester, K. K., Biglan, A., & Metxler, C. W. (2005). Relationships between peer harassment and adolescent problem behaviors. *Journal of Early Adolescence, 25*, 453-477.
- Sabrina, R. (2006). Victimization of obese adolescents. *Journal of School Nursing, 22*, 201-206.

- Sandstrom, M., & Schanber, L. (2004). Brief report: Peer rejection, social behavior, and psychological adjustment in children with juvenile rheumatic disease. *Journal of Pediatric Psychology, 29*, 29-34.
- Sebanc, A. (2003). The friendship features of preschool children: Links with prosocial behavior and aggression. *Social Development, 12*, 249-268.
- Shakeshaft, C., Mandel, L., Johnson, Y., Sawyer, J., Hergenrother, M., & Barber, E. (1997). Boys call me cow. *Educational Leadership, 55*, 22 -25.
- Silventoinen, K., Sans, S., & Tolonen, H. (2004). Trends in obesity and energy supply in the WHO MONICA project. *International Journal of Obesity, 28*, 710-718.
- Snyder, J., Horsch, E., & Childs, J. (1997). Peer relationships of young children: Affiliative choices and the shaping of aggressive behavior. *Journal of Clinical Child Psychology, 26*, 145-156.
- Stradmeijer, M., Bosch, J., Koops, W., & Seidell, J. (2000). Family functioning and psychosocial adjustment in overweight youngsters. *International Journal of Eating Disorders, 27*, 110-114.
- Sullivan, T., Farrell, A., & Kliwer, W. (2006). Peer victimization in early adolescence: Association between physical and relational victimization and drug use, aggression, and delinquent behaviors among urban middle school students. *Development and Psychopathology, 18*, 119-137
- US Department of Health and Human Services (2001). *The Surgeon General's call to action to prevent and decrease overweight and obesity*. Rockville, MD, 1-4.
- Vila, G., Zipper, E., Dabbas, M., Bertrand, C., Jacques, J., Ricour, C., & Mouren-Simeoni, M. C. (2004). Mental disorders in obese children and adolescents. *Psychosomatic Medicine, 66*, 387-394.

- Werner, N. E., & Nixon, C. L. (2005). Normative beliefs and relational aggression: An investigation of the cognitive bases of adolescent aggressive behavior. *Journal of Youth and Adolescence*, 34, 229-243
- Wood, J., Cowan, P., & Baker, B. (2002). Behavior problems and peer rejection in preschool boys and girls. *Journal of Genetic Psychology*, 163, 72-88.
- Yang, Q., & Chen, F. (2001). Behavior problems in children with simple obesity [Abstract]. *Chinese Journal of Clinical Psychology*, 9, 273-277.
- Zeller, M. H., Saelens, B. E., Roehrig, H., Kirk, S., & Daniels, S. R. (2004). Psychological adjustment of obese youth presenting for weight management treatment. *Obesity Research*, 12, 1576-1586.
- Zimmer-Gembeck, M. J., Geiger, T. C., & Crick, N. R. (2005). Relational and physical aggression, prosocial behavior, and peer relations. *Journal of Early Adolescence*, 25, 421-452.

Appendix A

School Demographic Information

City	School	Grade Levels	Total Students	Total 1 st Grade	Reduced Lunches	Free Lunches
Carney	Carney		161	18	17.4%	74.0%
Depew	Gypsy		119	16	24.4%	63.9%
Drumright	Drumright					
Kellyville	Kellyville	Pre-3 rd	418	100	20.1%	40.8%
Mannford	Mannford	Pre-5 th	520	117	15.0%	37.3%
Oilton	JFK	Pre-8 th	280	18		
Pawnee	Pawnee	Pre-5 th	394	54	16.5%	54.1%
Perkins	Perkins	Pre-5 th	623	95	12.2%	29.5%
Perry	Perry	Pre-5 th	585	101	6.7%	36.2%
Prague	Prague	Pre-5 th	461	70	12.1%	38.2%
Ponca City	Liberty	Pre-5 th	317	38	11.0%	73.8%
Ponca City	Roosevelt	Pre-5 th	280	34	14.6%	20.7%
Ponca City	Trout	Pre-5 th	328	43	9.1%	25.3%
Ponca City	Union	Pre-5 th	293	40	17.4%	46.8%
Ponca City	Washington	Pre-5 th	247	36	13%	49.0%
Ponca City	Woodland	Pre-5 th	298	35	9.4%	15.1%
Shawnee	Bethel	Pre-5 th	547	82	14.3%	35.5
Shawnee	N.Rock	Pre-8 th	531	39	12.1%	38.8%
Shawnee	S. Rock	K-8 th	345	47	7.0%	17.7%
Shawnee	Will Rodger	1 st -5 th	426	86	13.1%	49.1%

-Chart continues to next page

Appendix A Con't

City	School	Native American	Asian	Hispanic	African American	Caucasian
Carney	Carney	130	0	1	0	30
Depew	Gypsy	40	0	0	2	77
Drumright	Drumright					
Kellyville	Kellyville	85	1	10	0	322
Mannford	Mannford	145	2	4	5	364
Oilton	JFK					
Pawnee	Pawnee	122	0	4	13	255
Perkins	Perkins	88	0	13	14	508
Perry	Perry	34	2	10	35	504
Prague	Prague	60	1	7	28	365
Ponca City	Liberty	55	2	23	22	215
Ponca City	Roosevelt	77	1	14	14	174
Ponca City	Trout	32	5	11	19	261
Ponca City	Union	48	0	6	12	227
Ponca City	Washington	29	2	10	14	192
Ponca City	Woodland	17	4	4	8	265
Shawnee	Bethel	85	0	6	4	452
Shawnee	N.Rock	174	2	13	12	330
Shawnee	S. Rock	47	4	3	3	288
Shawnee	Will Rodger	113	4	16	37	256

Oklahoma State University Institutional Review Board
Request for Determination of Non-Human Subject or Non-Research

6. Signatures

Signature of PI *John S. Am...* Date June 12, 2007

Signature of Faculty Advisor *Michelle K. ...* Date 6-13-07
(If PI is a student) *for Melanie Page*



Based on the information provided, the OSU-Stillwater IRB has determined that this project **does not** qualify as human subject research as defined in 45 CFR 46.102(d) and (f) and **is not subject to oversight by the OSU IRB.**



Based on the information provided, the OSU-Stillwater IRB has determined that this research **does** qualify as human subject research and **submission of an application for review by the IRB is required.**

Sue C. Jacobs
Dr. Sue C. Jacobs, IRB Chair

6-15-07
Date

VITA

Jeffrey Scott Anderson

Candidate for the Degree of

Master of Science

Thesis: RELATION BETWEEN BODY MASS INDEX AND AGGRESSION
 AMONG FIRST GRADE CHILDREN

Major Field: Psychology

Biographical:

Personal Data: Jeffrey S. Anderson Address: 215 N Murray Hall, Stillwater,
OK 74078 Phone: Cell (405) 269-2292 Work (405) 744-6028 E-mail:
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Education:

Completed the requirements for the Master of Science or Arts in Psychology at Oklahoma State University, Stillwater, Oklahoma in July, 2007.

B.A. Psychology, Langston University, 1999

A.A. Wentworth Military Academy, 1997

Professional Memberships:

American Psychological Society, Jan 2005 - present
American Psychological Association, Sep 2005 - present
Oklahoma Psychological Association, Sep 2005 - present

Name: Jeffrey Scott Anderson

Date of Degree: July, 2007

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: RELATION BETWEEN BODY MASS INDEX AND AGGRESSION
AMONG FIRST GRADE CHILDREN

Pages in Study: 48

Candidate for the Degree of Master of Science

Major Field: Psychology

Scope and Method of Study: The present study focused on the relationship between Body Mass Index (BMI) and aggression in first grade children. Participants in the study consisted of 608 first grade children at rural public elementary schools recruited as part of the USDA funded Families and Schools for Health study. Aggression was measured using the BASC-II (teacher and parent versions). The children's heights, weights, and ages were used to calculate BMI.

Findings and Conclusions: The results suggest that overweight are not significantly different from normal weight children on teacher or parent rated aggression. However, the at-risk for overweight children are perceived by teachers to bully other children more often than normal weight children.

ADVISER'S APPROVAL: Melanie Page, Ph.D.
