

A STUDY OF BULLYING VICTIMIZATION AND GENDER AS PREDICTORS OF  
MATCH TREATMENT RESPONSE AMONG SEVENTH GRADE BOYS AND GIRLS

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Bullying victimization may adversely impact treatment response among students in a weight management intervention, but existing research has not directly measured this effect. The current study used existing data from a school-based weight management intervention, *Motivating Adolescents with Technology to CHOOSE Health* (MATCH), to examine the relationship between bullying victimization frequency and MATCH treatment response. Participants ( $n = 1,235$ ) were identified as overweight, obese, or severely obese before the intervention began. Results suggest that as students' BMI increase, they report increased bullying victimization experiences; additionally, bullying victimization may negatively impact treatment response for students who are regularly bullied when compared to students who are never bullied. Gender differences were also considered, but there were no statistically significant relationships found between gender and methods of bullying victimization, and gender was not found to moderate the relationship between frequency of bullying victimization and treatment response, as originally hypothesized. Limitations of the current study, finding implications, and suggestions for future research are also discussed.



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## CHAPTER I: INTRODUCTION AND LITERATURE REVIEW

Bullying is a specific form of peer victimization where there is a power imbalance between the people in the bullying relationship; bullies maintain power over their victims and engage in intentional behavior to harm their victims over time (Aalsma & Brown, 2008). Bullying is considered the current leading form of school violence among school-aged children, with around 21% of children ages 12 through 18 reporting they were bullied at school during the academic year, according to a national survey from 2015 (U.S. Department of Education, National Center for Education Statistics [NCES], 2017).

All bullying is aggressive in nature, but not all aggression can be conceptualized as bullying. The three primary components used to define a bullying relationship and distinguish bullying as its own type of aggression include intentionality, repetition, and a power imbalance. Often, bullying is conceptualized in the context of two separate individuals and their individual characteristics and behaviors. Although these factors are important, focusing on the nature of the *relationship* between these two people is helpful in understanding why bullying occurs and how to best intervene (Rodkin, Espelage, & Hanish, 2015). Research related to bullying typically defines those involved in this relationship as either a bully (i.e., only a bully), a victim (i.e., only a victim), or a bully-victim (i.e., both a bully and a victim of bullying in various bullying relationships) (Holubcikova, Kolarcik, Geckova, Van Dijk, & Reijneveld, 2015).

Rodkin and colleagues (2015) assume forms of bullying victimization likely correspond to the well-defined types of aggression, which include physical aggression, verbal aggression, and social or relational aggression. Physical aggression within the context of a bullying relationship may include hitting, kicking, and pushing, whereas verbal aggression may include name-calling and insulting the victim. Social or relational aggression within a bullying

relationship can include repeated threats, continuously excluding the victim from a peer group, or spreading lies or rumors about the victim (Crick & Zahn-Waxler, 2003). Given the rise in technology use among school-aged children, cyberbullying or electronic bullying is a newer form of bullying that has been on the rise in recent years. Cyberbullying takes the relational aspects of bullying (e.g., name-calling, teasing, verbal threats) into the realm of the internet (Li, 2006). In a sample of 1,015 students, ages 14 through 18, over half (52.5%) reported experiencing at least one instance of cyberbullying (Calvete, Orue, & Gamez-Guadix, 2016).

Along with varying types of bullying, students from varying racial and ethnic groups differ in their bullying experiences. Black/African American students report slightly higher rates of bullying victimization (i.e., 25%) compared to White students (i.e., 22%). Hispanic students report the lowest rates of bullying victimization (i.e., 17%) (NCES, 2017). Bullying tends to occur at higher rates during middle school, compared to the high school years (Radliff, Wheaton, Robinson, & Morris, 2012). Highest bullying rates are in sixth grade, with 31% of sixth grade students reporting being bullied. Bullying rates decrease to around 15% of students reporting bullying by eleventh and twelfth grade. Interestingly, bullying rates do not seem to vary significantly between public and private schools or between urban and rural schools. Such data supports the idea of universal trends in bullying behaviors among children and adolescents (NCES, 2017).

Bullying perpetration is an intentional activity, with bullies often aiming to obtain something from participating in the bullying relationship. For example, bullies may bully to move up a social hierarchy or to maintain the social status they already have by keeping others at a lower level in the hierarchy. There is often a group effect as well; rallying group members around a shared mission in targeting the victim can serve as a primary motivator for the bullying

(Faris & Felmlee, 2011; Juvonen & Galván, 2009). Targets of group victimization are typically unpopular and rejected in some way prior to being bullied (Veenstra, Lindenberg, Munniksma, & Dijkstra, 2010). Bullies already established on the social hierarchy are considered socially integrated, and bullies trying to obtain status but not yet within the hierarchy are considered socially marginalized. Socially marginalized bullies may be at risk of being bullied themselves (Farmer et al., 2010; Rodkin et al., 2015).

### **Weight-Based Bullying Victimization**

Little is known about the bully-victim relationship before bullying begins; however, the unequal power in a bullying relationship can be initially established through a key difference between the bully and the victim, such as religion, race, sexual orientation, or disability status (Rodkin et al., 2015). Stigma-based bullying is victimization based on the premise that this key difference is a core feature of the victim's identity or perceived identity (Rosenthal et al., 2015). An identity feature which often results in stigma-based bullying victimization is weight-status. As rates of childhood obesity have risen throughout the years, prevalence-rates of childhood weight-based discrimination have also increased (Latner & Stunkard, 2003). Weight-based discrimination and stigma is estimated to have increased by over 66% within the last 10 years. Children who are overweight or obese report experiencing weight-based discrimination from their peers, teachers, and parents (Puhl & Heuer, 2009). Children who are overweight are more likely to be bullying victims and are more likely to experience frequent bullying experiences, compared to children who are not overweight (Fox & Farrow, 2008; Magklara et al., 2012; Wang, Iannotti, & Luk, 2010).

As a child's body mass index (BMI) increases, their chances of experiencing more than one form of bullying victimization (i.e., physical, verbal, and/or social or relational) increases as

well. Moreover, once a child is identified as a target of weight-based bullying, their likelihood of being a victim increases each year as they age through childhood and into adolescence (Puhl & Luedicke, 2012). An obese child may be around 50-60% more likely to be bullied than a child at a healthy weight (Lumeng et al., 2010; Sutin, Robinson, Daly, & Terracciano, 2016). Sutin and colleagues (2016) completed a longitudinal analysis of children ( $n = 3,929$ ) in Australia and found that children in the obese BMI category were around 55% more likely to be bullied compared to healthy weight children; children in the overweight BMI category were around 40% more likely to be bullied compared to healthy weight children. Along with current weight status, experiencing an increase in BMI over time increases one's risk of being bullied (Feeg, Candelaria, Krenitsky-Korn, & Vessey, 2014).

Being dissatisfied with one's own body weight, regardless of one's actual weight, results in low self-esteem and low self-image which are thought to be additional key factors that can differentiate a victim of bullying from their perpetrators, exacerbate a power differential, and increase the risk of being a target of bullying (Holubcikova et al., 2015). Higher BMI is a risk factor for poor self-concept (Bacchini et al., 2017), and adolescents who have poor self-concept, high levels of insecurity, and are dissatisfied with their body weight are more likely to become victims of bullying (Holubcikova et al., 2015).

Weight-based bullying is often identified as the most-common form of stigma-based bullying in schools by both children and adults (Bradshaw, Waasdorp, O'Brennan, & Gulemetova, 2011; Puhl et al., 2016; Puhl, Luedicke, & Heuer, 2011). Researchers conducted a cross-national study and asked adults from Canada, Iceland, Australia, and the United States why children are teased or called names. In each country, participants identified "being fat" as the primary reason youth are bullied (Puhl et al., 2016). Over 5,000 teachers and school staff

members surveyed nationwide noted that weight-based bullying is a greater problem in schools than bullying based on gender, sexual orientation, or disability status (Bradshaw et al., 2011). Students agree that weight-based bullying is one of the most common forms of stigma-based bullying they observe among peers. Adolescents ( $n = 1,555$ ) from two different schools were asked to rank the most common reasons their peers are teased or bullied. Students from one school indicated that being overweight was a more frequent reason for being teased than race/ethnicity, disability status, religion, school ability, income status, or perceived sexual orientation. Students from the second school in the study identified being overweight as the most common reason for teasing or bullying, second to perceived sexual orientation (Puhl et al., 2011).

Weight bias and shaming behaviors are found in children as young as 3-years old, indicating these ideas can be shaped at an early age (Cramer & Steinwert, 1998), but weight-based bullying may become more salient during adolescence due to changes in appearance and body size and the influence of sexual development (Hazen, Schlozman, & Beresin, 2008; Janssen, Craig, Boyce, & Pickett, 2004). In response to physical changes, adolescents gain increased awareness regarding the way their bodies look compared to same-aged peers. This increased awareness, along with societal messages about the ideal body image, likely contributes to the identification of overweight or obese individuals as a target for weight-based bullying, given that they differ from what is considered the norm (Buote, Wilson, Strahan, Gazzola, & Papps, 2011; Markey, 2010; Puhl & Latner, 2007).

### **Adverse Outcomes Due to Weight-Based Bullying Victimization**

All forms of bullying victimization can contribute to lasting adverse mental and physical health outcomes for bullying victims (Allison, Roeger, & Reinfeld-Kirkman, 2009). Students

who are victims of bullying report less support from same-aged peers at school, increased loneliness, not feeling connected to their school environment, and not feeling safe at school, when compared to students who are not bullying victims (Lester, Cross, Dooley, & Shaw, 2013). Children and adolescent victims of bullying report higher rates of substance use (Radliff et al., 2012), disordered eating (Copeland et al., 2015), depression, suicidal ideation, suicide attempts, and lowered self-esteem (Didden et al., 2009; Gamez-Guadix, Orue, Smith, & Calvete, 2013; Gini & Espelage, 2014), when compared to children and adolescents who are not bullied. Adults who experienced bullying in childhood are at an increased risk of experiencing mental health difficulties, such as higher rates of depression and anxiety, self-harm, and suicidality, compared to adults who were not bullied in childhood (Costello et al., 1996; Golding, Pembrey, & Jones, 2001; Lereya, Copeland, Costello, & Wolke, 2015).

Stigma-based bullying, such as weight-based bullying, is most strongly associated with adverse outcomes, when compared to experiencing non-stigma-based bullying (Russell, Sinclair, Poteat, & Koenig, 2012). Adolescent victims of weight-based bullying report lower self-esteem, increased symptoms of depression, increased suicidal ideation, increased suicide attempts, increased symptoms of anxiety, increased substance use, decreased body satisfaction, increased experiences of peer rejection, increased feelings of isolation, and fewer close relationships within the school environment, when compared to adolescents who do not experience weight-based bullying, even after controlling for BMI or body weight (Eaton, Lowry, Brener, Galuska, & Crosby, 2005; Eisenberg & Neumark-Sztainer, 2008; Eisenberg, Neumark-Sztainer, & Story, 2003; Goldfield et al., 2010; Lunde, Frisén, & Hwang, 2006; Puhl & King, 2013; Puhl et al., 2011). Students who experience weight-based bullying attend school less often and perform

poorer academically than their peers not in a bullying relationship (Caird et al., 2011; Krukowski et al., 2009).

There are physical consequences of weight-based bullying victimization, as well. Rosenthal and colleagues (2015) analyzed whether or not emotional symptoms (e.g., worry, sadness) could mediate the relationship between weight-based bullying and physical health outcomes among a sample of low SES, urban, and mostly Black and Latino adolescents ( $n = 644$ ). They found that emotional symptoms did have a mediating effect, and weight-based bullying was indirectly associated with higher blood pressure, higher BMI, and self-report of decreased overall health across a two-year time period. Other studies have indicated a relationship between weight-based bullying victimization and engaging in maladaptive health behaviors over time, such as poor eating habits (Haines, Neumark-Sztainer, Wall, & Story, 2007; Libbey, Story, Neumark-Sztainer, & Boutelle, 2008) and reduced physical activity (Faith, Leone, Ayers, Heo, & Pietrobelli, 2002). Students who report increased negative affect (e.g., low self-esteem, depression) as a result of their weight-based victimization experiences also report increased binge eating and overall food consumption and avoidance behaviors related to physical activity (e.g., skipping their Physical Education class), compared to students who do not report increased negative affect (Puhl & Luedicke, 2012). Longitudinal studies indicate there may be an association between weight-based bullying experiences in childhood and adolescence and negative physical health outcomes in adulthood, even when controlling for other factors (e.g., BMI) (Rosenthal et al., 2015).

Given that weight-based bullying is pervasive, has lasting mental and physical health outcomes, and given that obesity is a growing health concern, it seems reasonable to assume that a specific intervention related to weight-based bullying would be a component of larger school-



based anti-bullying programs (Puhl & King, 2013; Puhl et al., 2011). But a meta-analysis analyzing 275 school-based anti-bullying programs from 1966 to 2013 found no interventions targeting weight-related bullying in any way (Aime, LeBlanc, & Maiano, 2017). Earnshaw and colleagues (2018) also conducted a review of stigma-based bullying interventions, narrowing the range of various bullying interventions considered. Out of the 8,240 articles analyzed, 21 stigma-based bullying interventions were identified. Out of these 21 stigma-based bullying interventions, only one specifically addressed victimization due to weight (i.e., Panzer & Dhuper, 2014). It is possible that weight-based bullying interventions are not prevalent because weight bias and stigma are often considered socially acceptable (Puhl & King, 2013).

Without bullying programs and interventions in schools that work to specifically target high-risk students, these students will likely not talk to adults about their experiences due to a fear of being invalidated (Aime et al., 2017). In the previously mentioned weight-based bullying intervention (i.e., Panzer & Dhuper, 2014), none of their five participants, ages 10-12 years old, reported telling an adult about their weight-based victimization experiences. Currently, only 23% of students who experience weight-based victimization report telling an adult at school (Puhl & Luedicke, 2012). Despite few students actually going to an adult for assistance regarding their bullying experiences, 55% of students who report weight-based bullying report that they would want help from a teacher at school, while 66% of students who report weight-based bullying report that they would want help from a friend or peer. Training staff and students in the school environment to recognize and intervene appropriately during weight-based bullying victimization experiences might be considered when planning a school-wide bullying prevention and intervention program; this may help offset additional adverse impacts of weight-based bullying victimization (Puhl, Peterson, & Luedicke, 2013).

## **The Effect of Bullying on Weight-Based Intervention Treatment Response**

With approximately 34% of adolescents in the United States estimated to be overweight and 30% of adolescents in the United States estimated to be obese, obesity is a growing health concern (Ogden, Carroll, Curtin, Lamb, & Flegal, 2010; Puhl et al., 2013). Rising rates of obesity contribute to the increasing prevalence rates of chronic diseases, such as type 2 diabetes (Ogden, Carroll, Kit, & Flegal, 2014). Obesity is considered the fifth leading risk factor for mortality, while insufficient physical activity is the fourth leading risk factor (World Health Organization, 2009). Given this growing concern, school-wide interventions to address weight concerns have become important to various stakeholders in schools, healthcare facilities, and communities. Schools are ideal locations for addressing weight issues in children, because many children can be accessed in a central setting; most children spend a large majority of their week in a school building. Further, it is often easier to ensure stakeholder involvement in schools than in other settings. Research supports the implementation of weight-based interventions in schools by demonstrating they can promote an increase in healthy eating and physical activity among students, resulting in lasting behavioral changes; some of these interventions have also resulted in weight reduction for students who were overweight or obese prior to the school-based intervention (Heo, Pietrobelli, Wylie-Rosett, & Faith, 2018).

Many factors, including bullying victimization, have the potential to interfere with treatment success for an overweight or obese student within a school weight-based intervention. Understanding such factors and the mechanisms through which they occur can improve future intervention outcomes (Rosenthal et al., 2015). An individual's health behaviors do not develop independently; although one's personal preferences or individual characteristics contribute to the development of health-related behaviors, interpersonal factors (e.g., relationships with peers,

relationships with family members) and environmental factors (e.g., school climate, access to extracurricular activities) also play a role (Bronfenbrenner & Morris, 2006). Bullying is an interpersonal factor which can impact one's perception of their environment and one's health-behaviors. As previously mentioned, weight-based bullying has been associated with poorer eating habits, increased likelihood of binge eating, and reduced physical activity in students who are victimized; this may also explain why overweight or obese victims of weight-based bullying have an increased likelihood of gaining weight over time (Haines et al., 2007; Libbey et al., 2008; Neumark-Sztainer et al., 2002; Puhl & Leudicke, 2012). A reciprocal interaction between weight-based bullying and a child's weight may exist, where the child's physical appearance may trigger a bullying response and this negative interaction may contribute to the child's continual weight gain (Janssen et al., 2004). Inversely, health-behaviors may also impact bullying experiences. For example, Grasten & Yli-Piipari (2019) found that after implementing a vigorous physical activity program with elementary school students for two years, teachers noted that violence and bullying among the students in the intervention group was reduced.

It is thought that mental health components can mediate the relationship between weight-based bullying and physical health outcomes, both positively (e.g., child having emotional coping skills) and negatively (e.g., child experiencing increased symptoms of depression), but additional research is needed regarding this connection (Brondolo et al., 2005; Pascoe & Smart-Richman, 2009; Puhl & Latner, 2007; Williams & Mohammed, 2009). Rosenthal and colleagues (2015) conducted research measuring the mechanisms through which stigma-based bullying (e.g., weight-based bullying) is associated with poorer physical health outcomes. Results indicated that through the mechanism of greater emotional symptoms (e.g., having worries, being unhappy or depressed, being nervous), as measured on the *Strengths and Difficulties*

*Questionnaire*, weight-based bullying was directly associated with decreased overall self-rated health (i.e., indicated by responses to “In general, would you say your health is excellent, very good, good, fair, or poor?”) across a two year time period.

Students who are bullied while participating in a weight-based intervention are less likely to engage in physical activity, compared to students who are not bullied. Decreased physical activity may adversely impact weight-based intervention outcomes. Previous research has determined that children who experience weight-based teasing report a more negative attitude towards engaging in physical activity than children who do not experience weight-based teasing (Jensen & Steele, 2010). Children who are at a higher weight and also experiencing criticism about their weight during physical activity participation, report less enjoyment participating in sports and report participating in physical activity less often than children who are not receiving such criticism (Faith et al., 2002).

For students who experience weight-based teasing, their self-efficacy, or belief in their ability to achieve something, decreases as weight-based teasing increases (Losekam, Goetzky, Kraeling, Rief, & Hilbert, 2010). Greenleaf and colleagues (2014) found that middle school students ( $n = 1,419$ ) who experience weight-based teasing have lower self-efficacy compared to students who do not experience weight-based teasing. Self-efficacy was measured by asking, “On most days, I can be physically active.” Students who experienced weight-based teasing also reported lower levels of physical self-concept, measured by questions such as, “I can run a long way without stopping,” “I am a physically strong person,” and “My body is flexible.” Further, they exhibited lower levels of actual physical fitness abilities, measured by push-ups, curl-ups, and the sit-and-reach. As expected, the students reporting weight-based teasing also endorsed

lower levels of self-esteem and higher levels of depression, compared to the students not experiencing weight-based teasing.

Given the associations found between weight-based bullying and physical health outcomes (e.g., increased BMI, decreased self-rated health) (Greenleaf et al., 2014; Rosenthal et al., 2015), weight-based bullying and health behaviors (e.g., poorer eating habits, decreased physical activity, decreased health-related physical fitness) (Faith et al., 2002; Jensen & Steele, 2010; Puhl & Luedicke, 2012), weight-based bullying and cognitive and emotional factors (e.g., reduced physical self-concept and physical activity self-efficacy, increased depression, lowered self-esteem) (Greenleaf et al., 2014; Losekam et al., 2010; Rosenthal et al., 2015), and weight-based bullying and skipping school (Puhl & Luedicke, 2012), weight-based bullying victimization experiences likely adversely impact the treatment response of overweight and obese students who are bullied during the course of a weight-based intervention within the school setting. If the outcome measure within the context of a weight-based intervention is BMI, then overweight and obese students who are eating unhealthy foods, avoiding PE, not engaging in sports and physical play activities outside of school, and skipping classes where intervention psychoeducation and practice occurs, all partially in response to their bullying victimization experiences, would likely not respond as well to the intervention as overweight and obese students who are not being bullied.

### **Gender Differences in Bullying Victimization**

Bullying victimization experiences differ for girls and boys. Based on national data in the United States from 2015, girls reported being bullied at slightly higher rates than boys (23% versus 19%, respectively) (NCES, 2017); however, girls may be more likely than boys to inform adults about their bullying experiences (Li, 2006). Although boys and girls are bullied at similar

rates, most bullies are boys. Therefore, girls are more likely to be bullied by a boy than by a girl. Rodkin & Berger (2008) found that 60% of girls reported being bullied by a boy, instead of another girl. When boys target boys they often engage in physical aggression, but when boys target girls they often engage in verbal aggression (Hanish, Sallquist, DiDonato, Fabes, & Martin, 2012; Rodkin & Berger, 2008; Scheithauer, Hayer, Petermann, & Jugert, 2006). Whereas boys often experience physical forms of bullying victimization, girls often experience relational and verbal aggression (Wiseman, 2002). In a large sample of middle school students ( $n = 3,867$ ) in a Northeastern state in the United States, boys admitted to being involved in more direct bullying experiences (i.e., physical contact) than girls, but girls reported increased rates of cyberbullying than boys (Connell, Schell-Busey, Pearce, & Negro, 2014). Consistently, previous research shows that girls are less likely than boys to experience physical victimization (e.g., punching, hitting, and pushing) as a part of their bullying experiences (Jeong, Davis, Rodriguez, & Han, 2016).

Despite girls being less likely to experience physical aggression than boys, girls with higher BMI are more likely to experience physical aggression within their bullying victimization experiences compared to girls with lower BMI; this same effect is not found in boys (Janssen et al., 2004). Overweight girls may be at a higher risk of weight-based bullying victimization than overweight boys (Eisenberg et al., 2003; Neumark-Sztainer et al., 2002; Puhl et al., 2013). Given that girls are exposed to more experiences of weight-based bullying, this may contribute to girls reporting a more negative body image than boys (Holubcikova et al., 2015; Vilhjalmsson, Kristjansdottir, & Ward, 2012). Girls are also more likely than boys to report being bothered by teasing or bullying behaviors (Feeg et al., 2014). In a study of reactions among bully victims, girls reported more negative feelings (e.g., sad and mad) than boys, as well as increased

rumination regarding their bullying experiences. In other words, girls appeared to think about their victimization experiences more often than boys. Such rumination and distress can affect girls' self-concept or sense of self (Paquette & Underwood, 1999).

Puhl and Luedicke (2012) aimed to determine differences in boys' and girls' victimization experiences ( $n = 1,598$ ) in the context of weight-based teasing. Girls who were victims of weight-based teasing reported experiencing more negative affect (i.e., feeling angry, sad and depressed, worse about oneself, and bad about one's body), compared to boys who experienced weight-based teasing. Boys reported being less bothered by weight-based teasing than girls. Specifically, girls reported being more bothered by weight-based teasing as the frequency of the teasing incidents increased, while boys did not report increased distress with an increase in the frequency of weight-based teasing incidents. The location of the weight-based teasing incidents impacted boys and girls differently, as well; boys and girls both reported increased negative affect when weight-based teasing occurred in the classroom, but only girls reported increased negative affect when weight-based teasing occurred in gym class.

Weight-based teasing in the context of a gym class may be more distressing for girls than boys, given differences in body image concerns. Grosick, Talbert-Johnson, Myers, and Angelo (2013) found that among a sample of middle school students ( $N = 334$ ), girls report significantly higher levels of identification with their body image through the endorsement of the statement, "My appearance is an important part of who I am." Girls, more so than boys, also significantly report higher rates of being on a diet and being depressed or concerned about their appearance. Girls usually begin gym class in middle school, which is around the same age girls become more aware of the way their body looks in comparison to others and begin to conceptualize their self-image and self-worth in the context of their appearance (Barr-Anderson et al., 2008). Jensen and

Steele (2009) concluded that girls who report increased levels of criticism from others regarding their weight and higher levels of dissatisfaction with their own bodies participate in significantly fewer vigorous physical activities, compared to girls who experience this same criticism without dissatisfaction of their own bodies; this finding was not found among boys. Therefore, body image issues and self-image may impact the quantity and quality of physical activity for girls more so than boys.

Differences in body image concerns may relate to the finding that middle school girls enjoy gym class less than middle school boys; further, overweight adolescent girls enjoy gym class less than adolescent girls who are not overweight (Taylor et al., 2002; Treanor, Graber, Housner, & Wiegand, 1998). It is important for girls to enjoy gym class, because a positive experience in gym class has been determined to have a significant long-term impact on girls' willingness to be more involved in physical activity later in life. In addition, enjoyment of gym class may be one of the strongest predictors of physical activity levels outside of school (Dishman et al., 2005; Sallis, Prochaska, & Taylor, 2000; Wallhead & Buckworth, 2004). For overweight girls, many of whom already dislike gym class, it is likely that experiencing weight-based teasing in the context of gym class would result in them disliking gym class even more and subsequently contribute to decreased physical activity outside of school. Avoidance of physical activity both inside and outside of school, in response to weight-based teasing or bullying, would likely impact girls' success in the context of a weight-based intervention.

Puhl and Luedicke (2012) found that girls and boys who reported negative affect in response to weight-based teasing, compared to boys and girls who did not report negative affect, reported an increased use of avoidance behaviors (i.e., avoiding participation in physical activities, avoiding gym class, avoiding social interaction and activities, and avoiding eating in



front of others) and increased eating responses (e.g., felt like eating more, tended to eat more food, and would binge/overeat due to being upset). The effect size for this finding was larger for girls than boys. Physical activity settings, both in and out of school, may increase the salience of body size for girls who already struggle with body image issues. This increase in salience may make girls more vulnerable than boys for weight-based teasing and emotional distress, which would increase the avoidance of physical activity to limit exposure to such teasing and distress.

### **Purpose of the Study and Hypotheses**

To address the obesity epidemic, a public-school teacher developed *Motivating Adolescents with Technology to CHOOSE Health* (MATCH) (Education Wellness Consulting, 2018). MATCH encourages and teaches seventh grade students to take responsibility for their health-care decisions (e.g., exercising and eating nutritious food) by helping them understand why it is important to make healthy lifestyle choices and how to do so. Students learn how to complete tasks such as calculating their own BMI, tracking their physical activity, and self-evaluating their various health behaviors (Lazorick et al., 2014). The MATCH program was first implemented in schools in 2006. As of 2016, MATCH expanded to 32 schools in North and South Carolina, as well as two schools in Mississippi. MATCH researchers studied the impact of their intervention on participants' BMI over a four-year intervention period. Given the expected changes in BMI over time for adolescents, z-scores were calculated for BMI to standardize these values (i.e., zBMI scores). Participants in the MATCH intervention group ( $n = 189$ ) showed a significant decrease in their standardized BMI scores when compared to a no-treatment control group ( $n = 173$ ) (mean zBMI change MATCH: -0.15; mean zBMI change control: 0.04). Along with a decrease in zBMI for participants in the MATCH group, there were some changes in health habits. A 29-item *Health Habits Questionnaire* was administered to

students, and the results showed that students in the treatment group reported consuming fewer sweet drinks and snacks and watched less television each week than a no-treatment control group. Thus, this curriculum-integrated health program may have long-term success in reducing obesity for school-aged children (Lazorick, Fang, & Crawford, 2016).

Despite the promise of the MATCH program, it is still unclear if or how students' bullying victimization experiences impact treatment success. Data were collected from the MATCH participants related to their bullying victimization experiences, both before and after the intervention, but it has not been determined whether intervention success is adversely impacted for the students who are overweight and obese at intervention onset and who also experience bullying victimization during the course of the MATCH intervention. The way in which gender influences such a relationship has yet to be determined, as well. These factors have not been amply addressed in the MATCH treatment literature but have clear implications for the MATCH program. For example, results may communicate the need to design efforts to support bullying victims throughout the course of the intervention. Further, given the gap in the weight-based intervention treatment literature related to the impact of bullying victimization on treatment success, these findings may help influence the design and implementation of additional school-based weight management interventions.

The current study uses an existing MATCH dataset to examine the relationship between students' BMI and the frequency of their bullying victimization experiences, as well as the relationship between bullying victimization frequency and MATCH treatment response. Gender differences will also be considered, in terms of the varying types of bullying boys and girls experience and whether gender impacts the relationship between the frequency of being bullied and MATCH treatment response. The current study will determine the degree to which the

previously stated relationships exist among the MATCH participants in the 2016-2017 cohort identified as overweight, obese, or severely obese before the intervention began, based upon survey results taken after the intervention ended and based upon standardized BMI calculations (i.e., pre-intervention zBMI and post-intervention zBMI). My specific research hypotheses are enumerated below.

**BMI and frequency of bullying victimization.** Boys and girls who are overweight have a greater likelihood of being a victim of bullying and a greater likelihood of having more frequent bullying experiences, compared to children who are not overweight (e.g., Fox & Farrow, 2008; Magklara et al., 2012; Wang et al., 2010). In addition, children who experience an increase in BMI over time, have an increased risk of being bullied compared to children who do not experience this change in weight status (Feeg et al., 2014). Among MATCH participants, it is expected that overweight and obese students, who have a higher BMI, are at a greater risk for being bullied more often during the course of the intervention.

*Hypothesis 1:* There will be a significant and meaningful positive relationship between post-intervention zBMI and bullying victimization frequency. As students' post-intervention zBMI values increase, self-report of frequency of bullying victimization experiences, on the post-intervention survey, will increase as well. Although I am most interested in whether or not this relationship existed throughout the course of the intervention, I predict there will be a significant and meaningful positive relationship between pre-intervention zBMI and bullying victimization frequency, before the intervention began as well.

**Frequency of bullying victimization and treatment response.** Weight status is one of the most common reasons, if not the most common reason, youth are bullied (e.g., Bradshaw et al., 2011; Puhl et al., 2011). Weight-based bullying victimization is associated with factors such

as reduced physical activity (Faith et al., 2002), increased binge eating (Puhl & Luedicke, 2012), poorer physical health outcomes, and an increase in BMI over time (Rosenthal et al., 2015). Therefore, it is likely the overweight and obese MATCH participants reporting increased bullying victimization experiences during the course of the intervention would be less responsive to treatment than the overweight and obese MATCH participants reporting fewer bullying victimization experiences.

*Hypothesis 2:* There will be a significant and meaningful inverse relationship between bullying victimization frequency and treatment response. Students identified as overweight or obese at the start of the intervention who report greater frequency of bullying victimization experiences throughout the course of the intervention as indicated on post-intervention surveys will have been less responsive to treatment (with response to treatment for overweight and obese students defined as a reduction in zBMI).

**Gender differences.** Gender based differences in bullying research indicate that girls, who are victims of bullying, are typically targeted through relational and verbal forms of aggression (e.g., Rodkin & Berger, 2008; Wiseman, 2002). Boys report higher levels of physical aggression within their bullying victimization experiences than girls (e.g., Jeong et al., 2016), while girls report more cyberbullying/electronic bullying than boys (Connell et al., 2014). Among the MATCH participants, it is hypothesized that these same patterns will emerge, when responses to the question regarding types of bullying experiences are analyzed on the post-intervention survey.

*Hypothesis 3a:* Levels of electronic bullying, verbal bullying, and relational bullying will be greater for girls than for boys.

*Hypothesis 3b:* Levels of physical bullying will be greater for boys than for girls.

**Gender as a moderator.** Girls are at a higher-risk than boys of experiencing weight-based bullying victimization throughout childhood and adolescence (e.g., Neumark-Sztainer et al., 2002; Puhl et al., 2013). Girls are also more likely than boys to report negative affect in response to bullying victimization and to report being more bothered by their victimization experiences (Feeg et al., 2014); this same effect is found specifically for weight-based bullying victimization, as well (Puhl & Luedice, 2012). Given that girls experience increased distress in response to bullying experiences, girls may subsequently engage in more maladaptive coping behaviors than boys in response to these experiences. For example, in response to weight-based bullying, girls and boys both demonstrate an increase in unhealthy eating responses and both demonstrate an increase in the avoidance of physical activity; however, the effect size of these findings was larger for girls than for boys (Puhl & Luekicke, 2012). Given this information, I assume being frequently bullied while participating in the MATCH intervention will impact intervention response for girls more so than for boys.

*Hypothesis 4:* Gender will moderate the relationship between bullying frequency and treatment response, with treatment response being defined as a reduction in zBMI among the participants initially identified as overweight, obese, or severely obese. Girls will be significantly less responsive to treatment than boys as bullying frequency increases. In other words, bullying will weaken the benefits of the MATCH program for girls more so than for boys.

## CHAPTER II: METHOD

### Participants

The current study used an archival data set collected by members of the MATCH program (UMCIRB 07-0741). The 2016-2017 data set used for the current study was comprised of 1,235 students in the seventh grade at 43 schools in North Carolina. The students included in the study were a subsample of students, from a total sample of 2,625 students, identified as overweight ( $zBMI$  range = 1.04 - 1.64), obese ( $zBMI$  range = 1.65 - 2.18), or severely obese ( $zBMI$  range = 2.18 - 3.07) before the intervention began. Only these students were included due to how treatment success is defined by participating in the MATCH program. Treatment success for overweight and obese students is defined as a reduction in  $zBMI$ , while treatment success for underweight students is defined as an increase in  $zBMI$ . The participants included in the study were all in the seventh grade, and the average age of the participants was 12.69 years ( $range = 11.21$  years - 15.04 years). Participants' average BMI z-score was 1.82 ( $range = 1.04 - 3.07$ ). Demographic information for the participants is included in Table 1.

Table 1

*Sample Demographics (n = 1,235)*

Variable	<i>n</i>	%
Gender		
Girls	651	52.71%
Boys	584	47.29%
Race		
American Indian/Alaskan Native	8	0.65%
Asian/Pacific Islander	15	1.21%
Black/African American	363	29.39%
Hispanic	238	19.27%
Multi-Racial	41	3.32%
Native Hawaiian or Other Pacific Islander	1	0.08%
White	569	46.07%
Weight Status		
Overweight	489	39.60%
Obese	446	36.11%
Severely Obese	300	24.29%

**Procedures**

Seventh grade students in the study were presented with a yearlong, school-based behavioral change program and integrated curriculum designed to increase healthy behaviors (e.g., healthy eating choices and increased physical activity) at school, at home, and in the community (Lazorick et al., 2014; Lazorick et al., 2016). The MATCH program encompasses four key components: Evaluate, Educate, Motivate, and Activate. The Evaluate component includes fitness testing and having the student complete a health behavior survey, as well as calculating the student's height, weight, blood pressure, BMI, and BMI percentile for their age. Within the Educate component, a 14-week series of lessons are taught to the students at school. Trained teachers provide lessons related to their individual subject areas based on MATCH curriculum. For example, a mathematics teacher could teach a lesson on how to calculate BMI. MATCH lessons can be incorporated across various academic subjects in this way. Students are

given a user-friendly MATCH workbook to assist them in learning and applying the taught material (Educational Wellness Consulting, 2018).

Within the Motivate key area, students are encouraged to set their own health-related goals and note the way in which they plan to meet these goals. Students are given various resources such as peer accountability contracts and an online system. Students can access these resources anytime and anywhere to track progress, as a means to assist them in meeting their personal goals. The online system provides visual incentives/images to encourage students to document their healthy choices and success. Students are motivated through age-appropriate rewards and incentives. Schools often have a recognition bulletin board for students making progress towards their health goals and may have tangible items provided to reward both short-term and long-term accomplishments. Rewards may include healthy food items at the end of the school day, T-shirts or rubber wrist bands given once a goal is met, and an end-of-year rewards day for participating students (East Carolina University, 2017; Lazorick, Hardison, Esserman, & Perrin, 2011).

## **Measures**

**BMI.** Each student's z-BMI scores were calculated before and after participating in the MATCH program and gender was reported. BMI z-scores were used instead of the actual BMI change values, due to z-scores being standardized values based on gender and age. Z-scores are more comparable than BMI values, given that BMI does not account for gender and age; this standardization was done by the MATCH team prior to my involvement in the analyses. Z-scores were calculated, based on comparing each participant's BMI to a reference population from the 2010 United States census.



**Bullying questionnaire.** Students participating in the MATCH program were also administered questions related to bullying experiences before and after participating in the yearlong program. MATCH researchers used a bullying questionnaire provided by a school counselor. The questionnaire items appear to be like those found in a school counseling book: *What makes a bully?* (Smart, 2016). In this book, the author presents an informal bullying rating scale informed by her professional experiences as a school counselor. The first question asks students to report how often they are bullied at school, and the second question asks students to report all of the ways in which they are bullied (e.g., called names, left out of a group) (see Appendix A). Unfortunately, these items have not been subjected to psychometric analysis, and there are no guidelines for scoring the items when conducting a quantitative analysis. My strategy for addressing this limitation is described below.

### **Data Analysis**

The statistical software package *IBM Statistical Package for the Social Sciences* (SPSS) version 25 was used for all quantitative analyses. Descriptive statistics (e.g., mean, standard deviation, and range) were obtained for all variables used in the study, as applicable. Careful data screening was conducted to identify data-entry errors, missing values, and extreme values. Response patterns on the question regarding frequency of bullying victimization were compared to the responses on the method of bullying victimization item. In addition, response patterns among participants on the method of bullying victimization item were analyzed, as well. Given that the response format is “Check all that apply,” data interpretation was confounded when participants checked both “I have not been bullied” and “I have been teased and called names,” for example.

My first hypothesis is that there is a significant and meaningful positive relationship between students' post-intervention zBMI and the frequency of their bullying victimization experiences throughout the course of the MATCH intervention. Because students' bullying victimization experiences were measured during their participation in the program, the responses on the post-intervention survey were used to conduct this analysis. I also determined if there was a meaningful and positive relationship between students' pre-intervention zBMI and the frequency of their bullying victimization experiences before the intervention began. The first bullying survey item asked students to report how often they have been bullied at school. Based on the options, I recoded the responses to quantify the bullying experiences. Specifically, the response *Never* was recorded as 0, *Sometimes, 1 or 2 times a month* was recorded as 1, *Regularly, 1 or 2 times a week* was recorded as 2, and *Every day* was recorded as 3. I then conducted a Kendall's tau correlation analysis between participants' post-intervention zBMI and their post-treatment survey response to the bullying questionnaire item 1. Additionally, I conducted a Kendall's tau correlation analysis between participants' pre-intervention zBMI and their pre-intervention survey response to the bullying questionnaire item 1.

For my second hypothesis, I conducted a one-way analysis of covariance (ANCOVA) to determine if there is a significant and meaningful inverse relationship between bullying victimization frequency and treatment response (i.e., reduction in zBMI for overweight, obese, and severely obese students). ANCOVA can be used with pretest-posttest designs to compare participants at different levels of the independent variable. In this case, the pre-intervention zBMI score was included in the model as a covariate in order to control for existing differences in BMI among the participants before the intervention began. The independent variable measured participants at four levels of bullying victimization frequency (i.e., never bullied,

sometimes bullied, regularly bullied, or bullied daily). Post-intervention zBMI was entered into the model as the dependent variable (Newsom, 2019; Schoemann, Gallagher, & Little, 2015).

Chi-square tests of independence were used to test hypotheses 3a and 3b, determining whether or not girls and boys differ in rates of various types of bullying victimization. Chi square tests compared the rates of boys' and girls' responses to each choice for the question regarding method of bullying victimization (see Appendix A), before then analyzing differences qualitatively in electronic bullying, relational bullying, verbal bullying, and physical bullying. The Bonferroni correction was used to adjust the alpha level to compensate for family-wise error.

A moderation analysis was used to test hypotheses 4, using PROCESS Model 1. A moderation analysis considers the way in which the relationship between two variables depends on the value of a third variable. In the current model, I first assessed whether or not frequency of bullying victimization and gender predicted treatment response by conducting a multiple regression analysis. I then determined whether gender impacted the strength of this relationship, using PROCESS to create interaction terms for each level of bullying victimization by gender. I hypothesized that gender moderates the relationship between bullying and treatment response, with girls being significantly less likely than boys to respond to the MATCH intervention as their frequency of bullying victimization increases. The variables included in this analysis were post-intervention survey results indicating frequency of bullying victimization experiences among the participants, gender, and the variables used to indicate treatment response (i.e., pre-intervention zBMI and post-intervention zBMI). Because the independent variable is categorical, I used indicator coding in PROCESS (Hayes, 2013; Hayes & Montoya, 2017).

When using PROCESS Model 1 with indicator coding, product terms were created to consider whether or not the interactions between each level of the independent variable (i.e., never bullied, sometimes bullied, regularly bullied, and bullied every day) and the moderator (i.e., gender) are statistically significant. If one of the interactions is statistically significant, this indicates that the strength of the relationship between this level of frequency of being bullied and treatment response is dependent upon whether or not the student is a boy or a girl. Because the moderator is dichotomous, I recoded boys as 0 and girls as 1. PROCESS analyses account for gender as a dichotomous variable and automatically provide the conditional effects of each level of bullying frequency on treatment response for boys and for girls. If the conditional effect of bullying frequency on treatment response is significant for boys and girls, the slope was interpreted to indicate the direction of the relationship (Hayes, 2013; Hayes & Montoya, 2017).

Instead of measuring treatment response using changes in BMI z-scores from pre-intervention to post-intervention (i.e., gain score model), the moderation analysis was conducted with post-intervention zBMI entered into the model as an outcome variable and pre-intervention zBMI entered into the model as a covariate (i.e., residual difference score model). Accounting for treatment response, by including pre-intervention zBMI as a covariate, was conducted in the same way in the ANCOVA for hypothesis 2, as stated above. Traditional change scores assume that without treatment, participants' scores would not change between pre-intervention and post-intervention. Using residual difference scores allows one to assume that even without treatment (i.e., MATCH intervention) participants' zBMI values would still follow a linear trend (Schoemann et al., 2015).

## CHAPTER III: RESULTS

The results of all conducted analyses are included in this chapter. Following data screening results and a description of missing data, all relevant statistical tests are reported. The statistical software package *IBM Statistical Package for the Social Sciences* (SPSS) version 25 was used for all quantitative analyses.

### Data Screening

Table 2 provides an overview of the collected data. Initial data screening results, including means, standard deviations, ranges, skewness, kurtosis, and confidence intervals at the 95th percentile, for pre-intervention zBMI and post-intervention zBMI are reported in Table 2. There was a positive correlation between pre-intervention zBMI and post-intervention zBMI,  $r = .88, p < .001$ .

Table 2

*Descriptive Statistics for Pre-Intervention zBMI and Post-Intervention zBMI*

Variable	<i>M</i>	<i>SD</i>	Min	Max	Range	Skewness	Kurtosis
Pre-zBMI	1.82	0.45	1.04	3.07	2.04	0.25	-0.82
Boys	1.84	0.44	1.04	2.93	1.90	0.11	-0.87
Girls	1.79	0.46	1.04	3.07	2.03	0.37	-0.73
Post-zBMI	1.73	0.54	-0.54	3.04	3.58	-0.17	-0.28
Boys	1.77	0.55	-0.54	2.92	3.46	-0.33	-0.23
Girls	1.70	0.53	-0.14	3.04	3.18	-0.03	-0.25

Based on the boxplots, there were three outliers for post-intervention zBMI scores. After analyzing the actual *z*-scores, these did not seem to be recorded in error. The three students who appear as outliers lost weight during the course of the intervention. They were in the category of “Overweight” when pre-intervention zBMI values were calculated but were in the category of “Healthy Weight” when post-intervention zBMI values were calculated. Along with the values

appearing to have not been recorded in error, they accounted for less than 0.01% of the data set; therefore, no cases were removed due to being an outlier.

### **Tests of Normality**

Results from the Shapiro-Wilk and Kolmogorov-Smirnov tests of normality were significant ( $p < 0.05$ ) for both pre-intervention zBMI and post-intervention zBMI, which suggests the data do not fit a normal distribution. Given that this data set has a large sample size, it is likely that small deviations from normality resulted in the significant results for the Shapiro-Wilk and Kolmogorov-Smirnov tests. Therefore, skewness numbers, boxplots, normal and detrended Q-Q plots, and histograms were analyzed in order to assess normality (see Figures 1 and 2). Pre-intervention zBMI was slightly positively skewed, with a skewness of 0.25 ( $SE = 0.07$ ) and kurtosis of -0.82 ( $SE = 0.14$ ). Post-intervention zBMI was slightly negatively skewed, with a skewness of -0.17 ( $SE = 0.07$ ) and kurtosis of -0.28 ( $SE = 0.14$ ). For each value of skewness and kurtosis,  $z$ -scores were calculated to determine whether or not values of skewness and kurtosis are significant. When considering cutoff scores suggested for large samples, pre-intervention zBMI skewness ( $z = 3.57$ ) and kurtosis ( $z = 5.86$ ) were significant ( $p < .001$ ); however, post-intervention zBMI skewness ( $z = -2.43$ ) and post-intervention zBMI kurtosis ( $z = -2.00$ ) were not significant ( $p > .01$ ). Although significance testing for skewness and kurtosis results in concern regarding pre-intervention zBMI values, as previously mentioned, the data set has a large sample size. In “very large” sample sizes, significance testing for skewness and kurtosis does not hold as much validity (Ghasemi & Zahediasl, 2012). The distribution is approximately symmetric, given that the absolute values of skewness are less than two in both instances. Given that both values of kurtosis are less than seven, kurtosis values provide additional support for normality. Because the data set for both pre-intervention zBMI and post-

intervention zBMI only includes individuals identified as having larger zBMI values prior to the intervention, some skewness is expected. Analysis of boxplots, histograms, and Q-Q plots do not depict a need to reject the assumption of normality (Field, 2005; Kim, 2013).

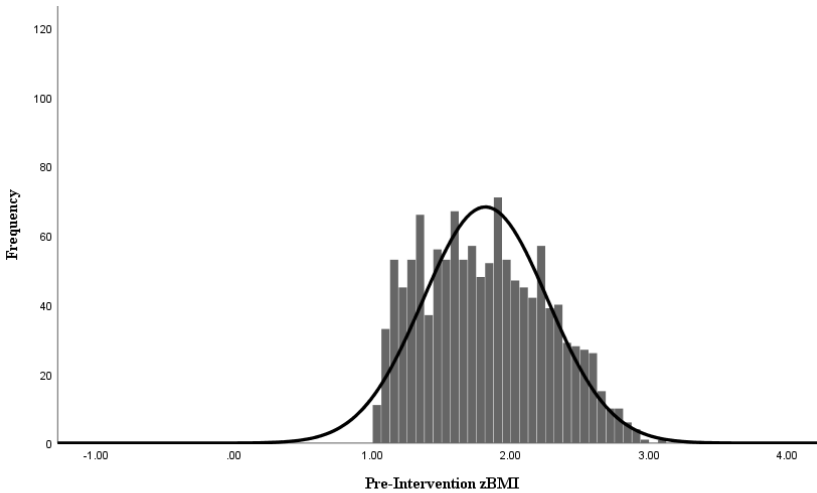


Figure 1. Pre-intervention zBMI histogram with normal curve

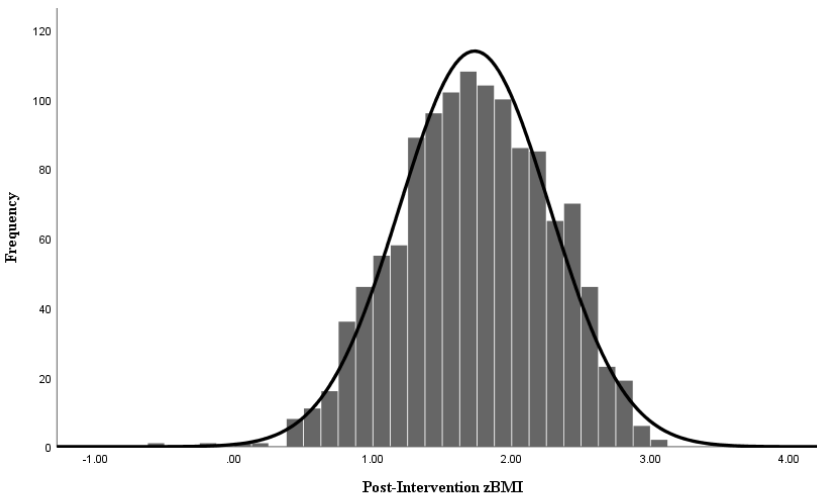


Figure 2. Post-intervention zBMI histogram with normal curve

### Missing Data

Out of the total sample of MATCH participants ( $n = 2,625$ ), only the overweight, obese, and severely obese students were included in this study ( $n = 1,235$ ). Out of the students included

in this study, all students had both pre-intervention zBMI and corresponding post-intervention zBMI measurements recorded, but some students had missing data on the post-intervention survey. Specifically, 14 students did not complete the survey at all, and additional students ( $n = 23$ ) did not respond to one or more items on the survey. Out of the 1,221 students who completed at least part of the survey, one student did not respond to the frequency of bullying victimization item, but this individual indicated they had not been bullied at all on the method of bullying item. Another 14 students did not respond to the method of bullying victimization item, but of these, 79% had chosen “Never” for the frequency of bullying victimization item. They likely did not respond to the question regarding method of bullying victimization, because they had already indicated they are never bullied. Missing data for the frequency of bullying victimization item (1.21%) and the method of bullying victimization item (2.27%) are both less than 5% of the entire sample; therefore, all data were used for analyses.

### **Correlation Between BMI and Bullying Victimization**

Due to the ordinal nature of the bullying victimization frequency item, a nonparametric correlation analysis (i.e., Kendall’s tau) was chosen over the bivariate Pearson’s correlation. Kendall’s tau correlation was chosen over Spearman’s correlation, which is also a nonparametric correlation analysis, given that there are many participants who chose the same answer for the multiple-choice question. Kendall’s tau correlation better accounts for a large number of tied ranks, compared to Spearman’s correlation. The assumptions of the Kendall’s tau correlation are that the variables are on an ordinal or continuous scale and that there is likely a monotonic relationship among the variables. These assumptions were met with the current data set. Post-intervention zBMI measurements and self-report of bullying victimization frequency were positively correlated,  $\tau_b(1220) = .09, p < .001$ . The positive correlation indicates a monotonic

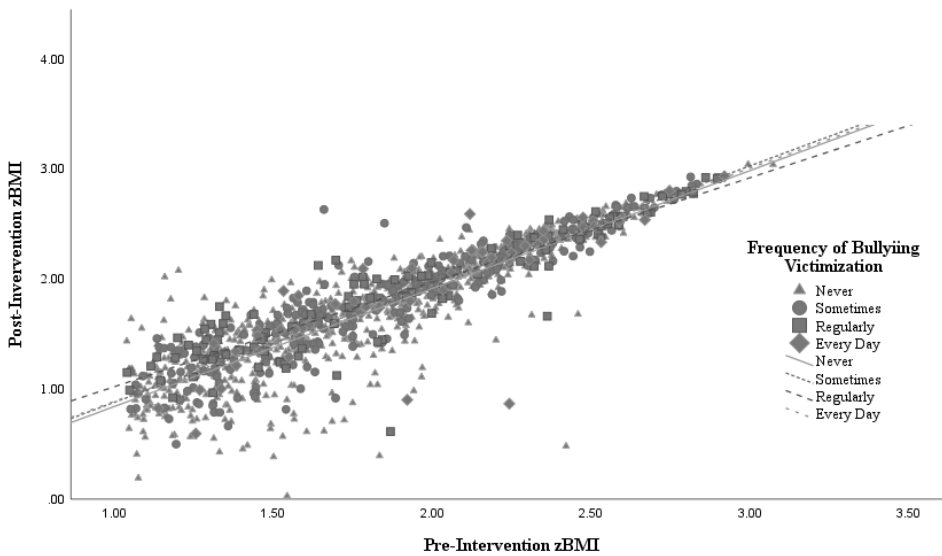


relationship in that as students' post-intervention zBMI measurements increased, they reported a higher frequency of bullying victimization experiences, and vice-versa. This same relationship was found when looking at the correlation between zBMI and frequency of bullying victimization, before the intervention began. Pre-intervention zBMI measurements and frequency of bullying victimization were positively correlated,  $r_b(1207) = .07, p = .001$ . But it is important to note that the magnitude of the relationship, for both pre-intervention and post-intervention correlations, appears weak based on standard interpretation of correlation coefficients (Akoglu, 2018).

### **Analysis of Covariance (ANCOVA)**

A one-way ANCOVA was conducted to determine the effect of bullying victimization frequency on treatment response. In order to account for treatment response, post-intervention zBMI was entered into the model as the dependent variable, and pre-intervention zBMI was entered into the model as a covariate. In assessing the assumptions of ANCOVA, both the dependent variable and the covariate were measured on a continuous scale. In addition, the independent variable consisted of four categorical groups (i.e., never bullied, sometimes bullied, regularly bullied, bullied every day), and the participants could only respond to one response choice, resulting in an independence of observations. Among the residuals, the maximum value of Cook's distance was 0.08 without separation from other values, suggesting that the model fit the data. Similar results were found when examining the Mahalanobis distances. There was a linear relationship between pre-intervention zBMI and post-intervention zBMI for each level of bullying victimization frequency, as assessed by visual inspection of the scatterplot (see Figure 3). Homogeneity of regression slopes is another required assumption of ANCOVA. Homogeneity of regression slopes confirms that there is not an interaction between the covariate

and the independent variable. There was homogeneity of regression slopes as the interaction term between pre-intervention zBMI and bullying victimization frequency was not statistically significant,  $F(3, 1212) = 2.04, p = .107$ .



*Figure 3.* Grouped scatter plot of pre-intervention zBMI by post-intervention zBMI by frequency of bullying victimization

Because there are different group sizes in each frequency of bullying victimization category, these data were unbalanced. Specifically, there were 782 participants who reported never being bullied, 272 participants who reported sometimes being bullied, 109 participants who reported regularly being bullied, and 57 participants who reported being bullied every day. Based on a visual inspection of standardized residual Q-Q plots, the residuals appeared less normally distributed in the categories of the independent variable with fewer participants compared to the categories with more participants. In addition to concerns regarding the

assumption of normally distributed residuals, there also appears to be heteroscedasticity instead of homoscedasticity.

The simple scatter plots of the standardized residuals for post-intervention zBMI by the predicted residuals for post-intervention zBMI were analyzed at each level of bullying victimization frequency (see Figure 4). Each plot, particularly for the group stating they have never been bullied and the group stating they are sometimes bullied, depicted an inward opening funnel. This inward opening funnel indicates heteroscedasticity; the variance of errors is not constant but is a decreasing function of  $y$ . A transformation was attempted but did not correct heteroscedasticity. In addition, a two-way ANCOVA with a new model adding gender in as a predictor was also attempted; however, the assumption of homoscedasticity was still violated. Although ANCOVA tends to be robust to violations of normality, given the violation of homoscedasticity, Type II sums-of-squares was used in the model instead of the more commonly used Type III sums-of-squares. In a Type III sums-of-squares model, the model gives each level of the independent variable equal weight, regardless of sample size; however, a Type II sums-of-squares model accounts for differences in sample size among levels of the independent variable by taking a sequential approach (i.e., lower order terms explain as much of the variation as possible initially before other terms explain variance) (Hector, von Felten, & Schmid, 2010; Langsrud, 2003). The heteroskedasticity-consistent standard error (HCSE) estimator of OLS parameter estimate (i.e., HC3) was also employed in this analysis to account for the heteroscedasticity.

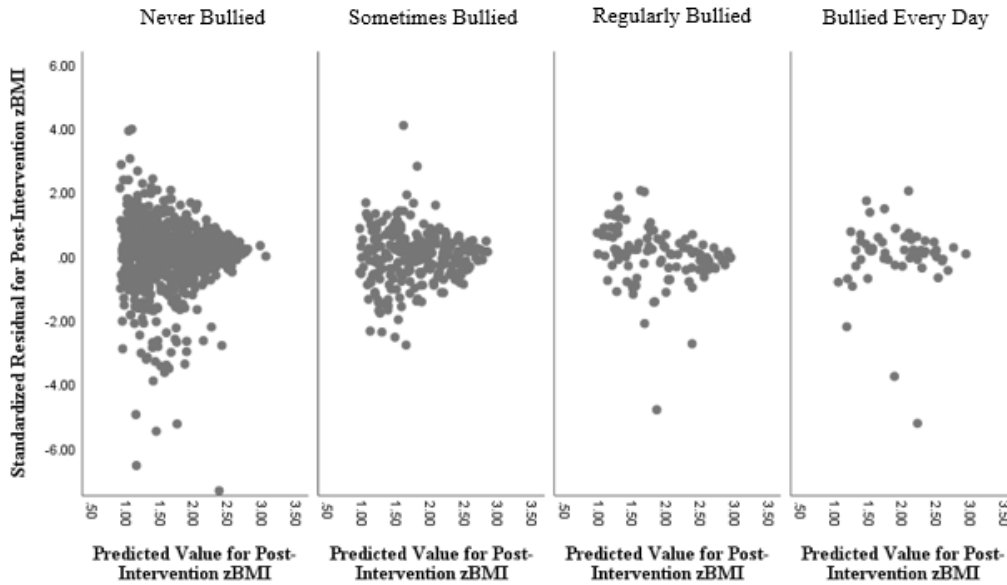


Figure 4. Simple scatterplot of standardized residual by predicted value for post-intervention zBMI grouped by frequency of bullying victimization

There was homogeneity of variances, as assessed by visual inspection of a scatterplot and Levene's test of homogeneity of variance ( $p = .139$ ). There were 24 values in the dataset with standardized residuals greater than  $\pm 3$  standard deviations, which indicated potential outliers; however, after further analysis, these values did not seem to be recorded in error and were not largely spread from the remainder of the data set.

Means for post-intervention zBMI were adjusted for each level of bullying victimization frequency to account for pre-intervention zBMI measurements (see Table 3). The ANCOVA results indicated a statistically significant difference in post-intervention zBMI between the levels of frequency of bullying victimization responses, when controlling for pre-intervention zBMI,  $F(3, 1215) = 3.63, p = .01, \omega^2 = .01, 95\% \text{ CI } [.00, .02]$  (see Table 4). Despite this significant difference, only 1% of the total variance in post-intervention zBMI was accounted for by the four levels of bullying victimization frequency. Given that ANCOVA results indicated a

statistically significant difference in post-intervention zBMI among levels of bullying victimization frequency, post hoc analysis was performed in order to explore mean differences among the four levels of bullying victimization frequency. Post hoc analysis was performed using a Bonferroni adjustment in order to correct for Type 1 error. Post-intervention zBMI values were significantly higher among the participants who reported they were bullied regularly ( $M = 1.79, SE = 0.02$ ), compared to the participants who reported they were never bullied ( $M = 1.71, SE = 0.01$ ) ( $M_{diff} = 0.07, 95\% CI [0.002, 0.14], p = .04$ ). There were no other statistically significant relationships among post-intervention zBMI and levels of bullying victimization frequency (see Table 5).

Table 3

*Adjusted and Unadjusted Means for Post-Intervention zBMI, with Pre-Intervention zBMI as a Covariate, with HC3 Adjusted Standard Errors*

Level of Bullying Victimization Frequency	Unadjusted			Adjusted		HC3 Estimation	
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SE</i>	<i>SE</i>	<i>p</i>
Never	782	1.68	0.54	1.71	0.01	0.03	< .001
Sometimes	272	1.77	0.52	1.76	0.02	0.03	< .001
Regularly	109	1.88	0.55	1.79	0.02	0.04	.001
Every day	57	1.92	0.54	1.75	0.03	0.05	.001

Table 4

*Analysis of Covariance for Post-Intervention zBMI by Frequency of Bullying Victimization*

Source	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>
Pre-Intervention zBMI	270.77	1	270.77	4173.54	<.01
Post-Intervention Frequency of Bullying Victimization	0.71	3	0.24	3.63	.01
Error	78.83	1215	0.07		
Total	4012.65	1220			

Table 5

*Multiple Comparisons and Mean Differences in Post-Intervention zBMI by Frequency of Bullying Victimization, while Controlling for Pre-Intervention zBMI*

Comparison	$M_{\text{diff}}$	$SE$	95% CI for $M_{\text{diff}}$	$p$
Never vs. Sometimes	-0.04	0.02	-0.09 – 0.01	.15
Never vs. Regularly	-0.07	0.03	-0.14 – -0.002	.04
Never vs. Every day	-0.04	0.04	-0.13 – 0.06	1.00
Sometimes vs. Regularly	-0.03	0.03	-0.11 – 0.05	1.00
Sometimes vs. Every day	0.003	0.04	-0.10 – 0.10	1.00
Regularly vs. Every day	0.03	0.04	-0.08 – 0.14	1.00

### Chi-Square Tests of Independence

Chi-square tests of independence were used to determine if boys and girls differ in rates of various types of bullying, as measured on the post-intervention bullying questionnaire. Both variables included in the analysis (i.e., gender and method of bullying victimization) were measured at the categorical level. Given that “Check all that apply” questions violate the assumption of independence of observations, chi square tests were individually conducted on each potential response choice. Dummy coding was used to indicate a “yes” or “no” response for each potential method of bullying victimization for each participant. The Bonferroni correction was used to account for family wise error. All expected cell frequencies were greater than five. There was not a statistically significant association between any of the method of bullying victimization response choices and gender (see Table 6).

Table 6

*Crosstabulation of Gender and Method of Bullying Victimization Endorsement*

Method of Bullying Victimization	Gender		$\chi^2$ (1)	<i>p</i>	Cramer's V
	Boys	Girls			
I have been teased and called names.	59 (10%)	56 (9%)	0.82	.37	0.03
I have been hit, kicked, pushed, or otherwise physically hurt.	27 (5%)	20 (3%)	2.02	.16	0.04
Others leave me out of their group.	21 (4%)	20 (3%)	0.26	.61	0.02
Others have taken my belongings.	21 (4%)	20 (3%)	0.26	.61	0.02
Others don't sit by me or talk to me.	14 (2%)	20 (3%)	0.52	.47	0.02
Others threaten to hurt me.	13 (2%)	18 (3%)	0.37	.55	0.02
Others bully me by phone, text message, or online.	13 (2%)	17 (3%)	0.19	.66	0.01
Others spread rumors about me.	19 (3%)	26 (4%)	0.48	.49	0.02

*Note.* Numbers under Gender represent the frequency count of participants endorsing this type of victimization. Percentages in parentheses indicate the percentage of the total number of boys or percentage of the total number of girls who endorse this type of victimization.

Each potential response choice was categorized as either verbal, physical, relational, or electronic bullying. "I have been teased and called names" and "Others threaten to hurt me" were categorized as verbal bullying. "I have been hit, kicked, pushed, or otherwise physically hurt" and "Others have taken my belongings" were categorized as physical bullying." "Others leave me out of their group," "Others don't sit by me or talk to me," and "Others spread rumors about me" were categorized as relational bullying. "Others bully me by phone, text message, or online" was categorized as electronic bullying. Due to the assumption of independence, statistical analyses were not performed on this categorization; still, more girls than boys endorsed experiencing verbal, electronic, and relational bullying, and more boys than girls endorsed experiencing physical bullying (see Table 7).

Table 7

*Frequency Count of Method of Bullying Victimization Endorsement by Gender*

Method of Bullying Victimization	Gender	
	Boys	Girls
Verbal Bullying	156 (27%)	217 (34%)
Electronic Bullying	17 (3%)	58 (9%)
Physical Bullying	90 (16%)	80 (13%)
Relational Bullying	110 (19%)	201 (32%)

*Note.* Numbers represent the frequency count of participants endorsing this type of victimization. Percentages in parentheses indicate the percentage of the total number of boys or percentage of the total number of girls who endorse this type of victimization.

**Moderation Analysis**

A multiple regression analysis was conducted initially in order to determine if gender and frequency of bullying victimization predict treatment response. Consistent with the previous ANCOVA analysis for hypothesis 2, the HC3 estimator and Type II Sums of Squares model was used during this analysis in order to account for heteroscedasticity. Treatment response was measured with post-intervention zBMI as the outcome variable and by entering pre-intervention zBMI into the model as a covariate, in order to control for existing BMI differences before the intervention began. Based on this model, frequency of bullying victimization does predict post-intervention zBMI,  $R^2 = 0.72$ ,  $F(3, 1211) = 3.70$ ,  $p = .011$ . Gender does not predict post-intervention zBMI,  $R^2 = 0.03$ ,  $F(1, 1211) = 0.38$ ,  $p = .536$  (see Table 8).



Table 8

*Bullying Victimization Frequency and Gender Predicting Post-Intervention zBMI, Controlling for Pre-Intervention zBMI*

Predictor	<i>b</i>	<i>se</i>	95% CI for b	<i>p</i>
Pre-Intervention zBMI	1.05	0.02	1.02 – 1.08	<.001
Gender	0.15	0.07	0.002 – 0.29	.05
Never Bullied	-0.20	0.03	-0.26 – -0.13	<.001
Bullied Sometimes	-0.16	0.03	-0.23 – -0.09	<.001
Bullied Regularly	-0.12	0.04	-0.20 – -0.04	.002
Bullied Every Day	-0.23	0.06	-0.34 – -0.11	<.001

A moderation analysis was conducted to determine the impact of gender on the relationship between frequency of bullying victimization and treatment response. Treatment response was accounted for by entering post-intervention zBMI into the model as the dependent variable and pre-intervention zBMI into the model as a covariate (i.e., residual difference score model). Gender was a dichotomous moderator and frequency of bullying victimization was a categorical predictor. Given that the independent variable was categorical, indicator coding (also known as dummy coding) was used to conduct the analysis. Indicator coding considered participants who were never bullied as the control group or comparison condition. None of the predictor variables had Pearson correlation values above 0.60, which suggests an absence of multicollinearity. Tolerance for each of the predictor variables was above 0.1, and the variance inflation factor was below 10 for each of the predictor variables, also indicating no significant concerns regarding multicollinearity. Given the previously mentioned concerns regarding heteroscedasticity, the heteroskedasticity-consistent standard error (HCSE) estimator of OLS parameter estimate was employed in this analysis. The HCSE estimator suggested for use in

PROCESS analyses is HC3. The HC3 estimator was used to generate the standard errors and account for heteroscedasticity (Hayes & Cai, 2007).

Post-intervention zBMI was predicted from pre-intervention zBMI, gender, and level of bullying victimization frequency,  $R^2 = 0.88$ ,  $F(8, 1211) = 620.69$ ,  $p < .001$ . Pre-intervention zBMI was entered into the model first in order to account for pre-intervention zBMI values when determining the effect of gender and level of bullying victimization frequency on post-intervention zBMI. Interaction terms were created for gender and levels of bullying victimization frequency, and the interactions at each level did not predict participants' post-intervention zBMI. Therefore, the relationship between bullying victimization frequency and treatment response is not dependent on or influenced by participants' gender (see Table 9 and Figure 5).

Table 9

*Moderation Analysis of the Relationship Between Bullying Victimization Frequency and Gender on Post-Intervention zBMI, Controlling for Pre-Intervention zBMI*

Predictor	<i>b</i>	<i>se</i>	95% CI for <i>b</i>	<i>p</i>
Pre-Intervention zBMI	1.05	0.02	1.02 – 1.08	<.001
Gender	-0.002	0.02	-0.04 – 0.04	.92
Bullied Sometimes	0.04	0.02	-0.001 – 0.09	.06
Bullied Regularly	0.06	0.04	-0.02 – 0.15	.13
Bullied Every Day	0.11	0.05	0.01 – 0.22	.03
Bullied Sometimes x Gender	-0.01	0.03	-0.07 – 0.06	.86
Bullied Regularly x Gender	0.01	0.05	-0.09 – 0.11	.84
Bullied Every Day x Gender	-0.14	0.08	-0.29 – 0.005	.06

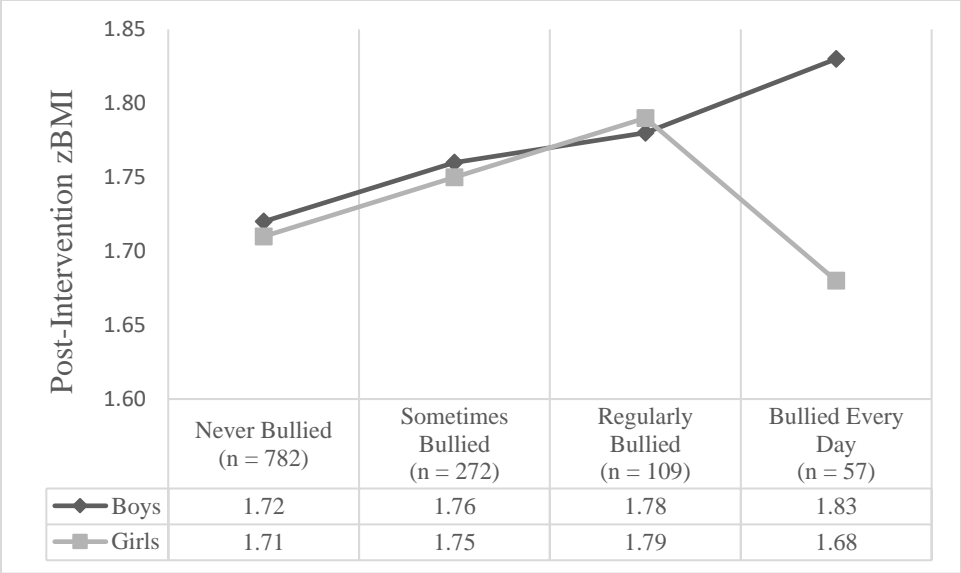


Figure 5. The conditional effects of bullying victimization frequency on post-intervention zBMI

## CHAPTER IV: DISCUSSION

Bullying among school-aged peers and growing health concerns surrounding pediatric overweight and obesity are two key issues being targeted today in the public-school system. Bullying is considered the leading form of school violence (NCES, 2017), and weight-based bullying victimization is considered one of the most common forms, if not the most common form, of stigma-based bullying victimization (Bradshaw, Waasdorp, O'Brennan, & Gulemetova, 2011; Puhl et al., 2016; Puhl, Luedicke, & Heuer, 2011). Although both bullying interventions and weight management interventions are common in schools, rarely do interventions intersect bullying victimization concerns and weight management concerns. Little is known about the impact that bullying victimization would have on a weight management intervention; however, existing research supports potential interference, with bullied students engaging in less physical activity, demonstrating poorer eating habits, and expressing less physical self-efficacy compared to students who are not bullied (e.g., Puhl & Luedicke, 2012; Rosenthal et al., 2015). Therefore, one of the primary goals of this study was to determine the impact of bullying victimization on treatment response, in the context of a school-based weight management intervention.

Although boys and girls are bullied at similar rates (NCES, 2017), bullying experiences differ for boys and girls. Boys often experience physical forms of bullying victimization, and girls often experience relational, verbal, and electronic aggression (Connell et al., 2014; Wiseman, 2002). In the context of weight-based bullying victimization, overweight girls may be at a higher risk of victimization (Eisenberg et al., 2003; Neumark-Sztainer et al., 2002; Puhl et al., 2013) and may also be more bothered or distressed by being bullied, compared to boys (Feeg et al., 2014; Paquette & Underwood, 1999; Puhl & Luedicke, 2012). Given these differences, the second goal of this study was to determine whether gender was a key factor in both the types

of bullying victimization students experienced during the MATCH intervention and whether gender impacted the relationship between bullying victimization and treatment response.

### **Summary of Results**

**Correlation between BMI and bullying victimization.** Results indicated that as students' zBMI increased, they were more likely to report a higher frequency of bullying victimization experiences at both pre-intervention and post-intervention; this is consistent with my hypothesis and consistent with previous literature on weight-based bullying victimization. Despite a significant relationship, the strength of the correlation between BMI and frequency of bullying victimization was weak. Although there are likely multiple explanations, the weak relationship may be partially due to range restriction. The value of a correlation is typically greater when there is increased variability among each variable involved in the analysis (Goodwin & Leech, 2006). In the current study, only zBMI values categorized as overweight, obese, or severely obese were included in the study. In addition, only four levels of bullying victimization frequency (i.e., never, sometimes, regularly, every day) were included, based on the way the survey was designed by the MATCH team. For both variables, the range was restricted, which may have suppressed the correlation coefficient.

**Analysis of covariance (ANCOVA).** Results from the one-way ANCOVA indicated that students who were bullied regularly during the course of the MATCH intervention were less responsive to treatment than students who were never bullied. These results were consistent with my hypothesis, but the effect size from the ANCOVA was very small. Small effect sizes, as well as the assumption violations from ANCOVA, indicate that these results must be interpreted with caution. I also expected students who were sometimes bullied and students who were bullied every day to be less responsive to treatment than students who were never bullied; however, this

was not supported by the results. For students who are sometimes bullied, it may be that their bullying experiences are not frequent or salient enough to interfere with treatment response. Although being bullied every day did not appear to impact treatment response to a meaningful degree, the sample size of students in the bullied daily group ( $n = 57$ ) was much smaller than the sample size of students in the never bullied group ( $n = 782$ ). This makes it difficult to accurately compare differences in treatment response among the two groups.

**Chi-square tests of independence.** Results indicated no significant relationship between any of the methods of bullying victimization and gender. This was inconsistent with my hypothesis; however, when analyzing the raw data after grouping the individual response options into categories of relational, electronic, verbal, and physical bullying, a higher percentage of girls than boys reported relational, electronic, and verbal bullying, and a higher percentage of boys than girls reported physical bullying. The relevant survey item asked participants to select all the methods of victimization they have experienced, which makes accurately analyzing the results of this item difficult. “Check all that apply” items typically violate the assumption of independence, given that participants can be in multiple comparison groups. In order to compensate for non-independence, each potential response option was analyzed independently, and multiple chi square tests were conducted. It is likely that only analyzing one item at time, instead of multiple items loading onto the same construct, as well as implementing the Bonferroni correction, reduced the power of the analyses.

**Moderation analysis.** Results of the moderation analysis did not support the hypothesis that gender impacts the relationship between bullying victimization frequency and treatment response. When looking at the conditional effects of bullying victimization on treatment response, the conditional means for boys and girls were similar for students who indicated they

were never bullied, sometimes bullied, and regularly bullied. For boys, responsiveness to treatment steadily decreased the more students indicated they were bullied during the course of the intervention (as indicated in Figure 5 by the increasing conditional means of post-intervention zBMI when controlling for pre-intervention zBMI). For girls, this same pattern was evident moving from the never bullied to the regularly bullied level of victimization; but interestingly, the post-intervention zBMI for girls who indicated they were bullied daily dropped significantly. The difference in the results among boys and girls who were bullied daily may partially be due to the small sample size in this level of the independent variable. As previously mentioned, there were only 57 participants who reported being bullied daily (27 boys and 30 girls). Variance in zBMI among these participants in the bullied daily group would have impacted the overall conditional means, due to the smaller sample size, more-so than in the group of students who were never bullied. But the difference in post-intervention zBMI in boys and girls who were bullied daily may be due some unknown factor, as well.

### **Limitations of the Present Study**

Along with the previously mentioned assumption violations, another primary limitation of the present study is the measure used to assess frequency of bullying victimization and method of bullying victimization. The bullying questionnaire items have not been subjected to psychometric analysis, and there are no guidelines for scoring the items when conducting a quantitative analysis. The wording of the method of bullying question was also somewhat unclear and may have been interpreted differently by different students. Out of the students who answered both the frequency of bullying victimization and the method of bullying victimization items on the post-intervention survey, over 12% (96 participants) reported “Never” for the frequency of bullying victimization item but then marked at least one response for options B

through D on the method of bullying victimization item (i.e., indicating experiencing some form of bullying, such as being physically hit or left out of a group). A student may not have been bullied, as defined by repetitive and targeted attacks, but may have been teased or may have had one of their belongings taken. Because response choice H (i.e., “Others bully me by phone, text message, or online”) includes the word “bully,” this made it clearer than the other response choices that the item should only be marked if a bullying relationship was involved.

Another limitation relates to inconsistency in how bullying is defined. When conducting research on bullying using self-report measures, as in the current study, one limitation is the fact that children define bullying in different ways depending on their understanding of the construct, depending on their previous experiences, and depending on their age. The way children define bullying is often different than the way researchers and those in academia define bullying. This represents a core limitation of the current study, and many other studies which measure bullying through self-report measures. A student who had an argument with a friend during the course of the MATCH intervention may have endorsed verbal bullying on the post-intervention survey if their definition of bullying only incorporated verbal aggression, without also incorporating the constructs of power imbalance, intentionality, or repetitiveness. Another limitation with self-report measures is that many students do not feel comfortable telling an adult about their bullying experiences. Even if the survey is presented in an anonymous format, there may still be students who are uncomfortable endorsing the fact that they have been bullied (Janseen et al., 2004; Vaillancourt et al., 2008).

Because the method of bullying victimization item was in a “Check all that apply” format, grouping the response items together in an analysis violates the assumption of independence; this assumption violation restricts the level of analysis allowed for this item.



Another limitation related to the assumption of independence, in the study overall, is the fact that there were multiple students from the same school within the sample. One school may implement the MATCH intervention in a different way than another school, or there may be certain factors about one school which makes it easier for students to benefit from the intervention compared to another school (e.g., access to healthier food choices in the school cafeteria or surrounding town, increased offering of sports or other physical activities outside of school). In addition, grouped data, with multiple students from multiple schools, does not account for school climate. Students who report higher levels of positive school climate report fewer bullying relationships within their school (Schell-Busey, Connell, & Kahle, 2017).

### **Implications for Future Research**

**Survey for assessing bullying victimization.** When using surveys to measure self-report of bullying victimization, it may be helpful to provide students with additional options to indicate the frequency of their bullying victimization experiences on a continuous scale (e.g., letting them indicate a frequency count of experiences within the past week, past month, and past year). Additionally, conducting analyses with balanced sample sizes among the independent variable, avoiding grouped data, and avoiding “Check all that apply” survey questions will aid in an easier and more accurate interpretation of the results. Future studies using self-report surveys would likely benefit from running psychometric analyses on the items before use and from clearly defining a definition of bullying, within the survey instructions, before having students report their experiences.

Given the connection between weight-based stigmatization and bullying, when asking students to self-report their bullying experiences, particularly in the context of a weight-based intervention, it would be useful to include at least one question to specifically assess weight-

based bullying victimization. There is a need for future research to develop and validate questionnaires that measure stigma-based victimization, and there is currently a lack of comprehensive questionnaires or self-report measures to effectively assess weight-based bullying victimization frequency among children and adolescents. Existing questionnaires also do not effectively assess how students respond to being victimized (e.g., impact on academics, emotional reactions), when students feel most victimized, or where students feel most victimized (e.g., gym class, classroom, outside of school). Understanding such factors will lead to more effective intervention for victimized students (Puhl & Luedicke, 2012).

**Responding to students who indicate bullying victimization.** Results of the current study do indicate that MATCH program results may be suppressed due to bullying, particularly among overweight and obese students who are bullied regularly. Therefore, intervening to address bullying victimization with these students may positively impact intervention response. Although bullying is a construct which has been widely studied since the 1970s, additional research is needed on the most effective ways to intervene. For example, the relationship between the bullying victim and the perpetrator before the bullying begins is still unclear. How often do the bully and victim start out as friends? What are the most common signs a friendship or acquaintance relationship is on the brink of becoming a bullying relationship? When is the best time to intervene (Greenleaf, Petrie, & Martin, 2014)? Victims of weight-based bullying have indicated they prefer intervention from their friends and peers first, before wanting intervention from adults; ways to best teach students how to recognize bullying and intervene appropriately is an area of potential growth within the bullying literature, as well (Puhl et al., 2013). Along with working to reduce bullying, future intervention efforts might focus on

increasing or promoting healthy relationships in schools built on trust and support instead of power and aggression (Pepler & Craig, 2011).

Given that weight management/healthy lifestyle interventions and bullying interventions are two of the most common types of school-based interventions, rarely do the two interventions take a combined or integrated approach. Because weight is one of the most common reasons youth are bullied, addressing bullying in the context of a weight management intervention supports students emotionally and likely impacts treatment response. The Center for Disease Control and Prevention has stated that although there is a streamlined focus on reducing BMI among youth, reducing weight bias is just as important (Panzer & Dhuper, 2014). Bowes, Marquis, Young, Holowaty, and Isaac (2009) studied Peers Running Organized Play Stations (PROPS), which is one of the few existing programs found in the literature to combine concerns related to both weight management and bullying simultaneously. PROPS trains children ages 10-13 to run cooperative games on the playground, supervise younger students, and use conflict resolution skills when needed in an effort to prevent bullying. Bowes and colleagues (2009) were primarily measuring feasibility and implementation and did not collect outcome data regarding bullying behaviors or impact on weight management. Recreating similar programs and measuring outcome data for both weight management and bullying behaviors represents a gap in the literature and direction for future research efforts.

As previously mentioned, there is also a lack of bullying interventions or anti-bullying programs specifically developed for stigma-based bullying, and even fewer interventions addressing weight-based bullying (Earnshaw et al., 2018). Further, there is a need for additional longitudinal research measuring the impact of stigma-based bullying experiences in childhood

and weight management as an adult, as well as the impact of bullying on other forms of physical health in adulthood (e.g., blood pressure, rate of acquiring illnesses) (Rosenthal et al., 2015).

Within the context of a weight management intervention, such as MATCH, asking questions about students' bullying victimization experiences would ideally lead to providing intervention and support to the bullying victims. Students who have been identified as victims of bullying but are not followed up with by adults are at risk for feeling more isolated, developing symptoms of anxiety and depression, and developing problematic behaviors resulting in increased weight gain (Aime et al., 2017). There are multiple ways to incorporate support for bullying victims or potential victims into a weight management intervention. When students struggle with a negative body image, they are at a higher risk of becoming a bully and a victim of bullying, compared to students who have a positive body image; therefore, discovering ways to best incorporate messages of body positivity is another area of need within the existing literature (Holubcikova et al., 2012).

Efforts to target bullying are an important consideration when developing a weight management intervention, such as MATCH, but there is a substantial likelihood that these efforts will not completely prevent bullying from occurring throughout the course of a school-year. Therefore, researchers who design and implement weight management programs may be able to support the identified bullying victims by determining the best ways to support them in the context of a weight-based intervention. Panzer and Dhuper (2014) developed what they knew to be the first treatment approach specifically designed to teach overweight and obese students how to respond to bullying in the school environment. Both the bullying victims and their parents were taught cognitive and behavioral coping techniques in order to work to reduce the frequency of the victimization experiences and reduce emotional distress. Continuing to study gender

differences in both bullying victimization and emotional responses to bullying will also provide further information regarding ways to best support students.

**Research design.** Success in the intervention was defined differently for students in different weight-based categories (e.g., defined as an increase in zBMI for students in the Underweight category and defined as a reduction in zBMI for students in the Overweight category). If conducting similar research with a different intervention design, future studies measuring the constructs of BMI and bullying victimization frequency may be most effective with a less restrictive sample range of BMI (e.g., not restricting the sample to only students who are overweight or obese).

## **Conclusion**

Results from this study are generally consistent with the existing literature in suggesting a relationship between being overweight or obese and experiencing bullying victimization. Results from this study also indicate that bullying victimization may adversely impact treatment response in the context of a weight-based intervention; however, these results must be interpreted with caution due to factors such as heteroscedasticity within the data set, varying sample sizes among levels of the independent variable (i.e., frequency of bullying victimization), and the fact that only a significant result in treatment response was found when comparing students who were never bullied to students who were bullied regularly. There were no statistically significant relationships found between gender and methods of bullying victimization; however, a higher percentage of girls reported experiencing relational, verbal, and electronic bullying, and a higher percentage of boys reported experiencing physical bullying. Gender was not found to moderate the relationship between frequency of bullying victimization and treatment response, as originally hypothesized. Future research is warranted to determine how to address concerns

related to bullying, and more specifically weight-based bullying victimization, within the context of a school-based weight management intervention; working to understand differences among boys and girls in regard to both weight management treatment response and bullying victimization experiences will assist in best targeting such efforts.

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## APPENDIX A: Bullying Questionnaire Items

1. “During this school year, how often have you been bullied at school?”
  - a. Never
  - b. Sometimes, 1 or 2 times a month.
  - c. Regularly, 1 or 2 times a week.
  - d. Every day.
  
2. “How were you bullied? Check all that apply.”
  - a. I have not been bullied.
  - b. I have been teased and called names.
  - c. I have been hit, kicked, pushed, or otherwise physically hurt.
  - d. Others leave me out of their group.
  - e. Others have taken my belongings.
  - f. Others don't sit by me or talk to me.
  - g. Others threaten to hurt me.
  - h. Others bully me by phone, text message, or online.
  - i. Others spread rumors about me.

## APPENDIX B: IRB Documentation



**EAST CAROLINA UNIVERSITY**  
**University & Medical Center Institutional Review Board Office**  
4N-70 Brody Medical Sciences Building· Mail Stop 682  
600 Moyer Boulevard · Greenville, NC 27834  
Office [252-744-2914](tel:252-744-2914) · Fax [252-744-2284](tel:252-744-2284) · [www.ecu.edu/ORIC/irb](http://www.ecu.edu/ORIC/irb)

### Notification of Amendment Approval

From: Biomedical IRB  
To: [Suzanne Lazorick](mailto:Suzanne.Lazorick@ecu.edu)  
CC:  
Date: 7/21/2017  
Re: [Ame27 UMCIRB 07-0741](#)  
[UMCIRB 07-0741](#)  
Motivating Adolescents Through Technology to Choose Health

Your Amendment has been reviewed and approved using expedited review for the period of 7/20/2017 to 8/29/2017. It was the determination of the UMCIRB Chairperson (or designee) that this revision does not impact the overall risk/benefit ratio of the study and is appropriate for the population and procedures proposed.

Please note that any further changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. A continuing or final review must be submitted to the UMCIRB prior to the date of study expiration. The investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Description:  
Addition of study team members: R. Kininger, O. Shipp, B. Schultz

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

