

**THE IMPORTANCE OF WEIGHT-RELATED VICTIMIZATION
IN ADOLESCENT OBESITY**

by

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A dissertation submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Psychology

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ABSTRACT

The goal of this study was to test a longitudinal serial mediation model in which weight-related peer victimization mediates the associations between obesity and a string of negative outcomes across the span of middle childhood (4th-5th grade) to adolescence (7th-8th grade). We hypothesized that youth with higher BMI are more likely to experience weight-related victimization and that this victimization sets off a chain of events including increased negative body cognitions, increased internalizing symptoms, and increased negative health behaviors which ultimately feeds back to adversely impact youth's BMI. Within this goal, we examined bidirectional effects within pairs of constructs as well as the full model.

During the 2013-2014 academic year, data were collected through classroom visits in fall (T1) and spring (T2) from 1440 students in 74 4th and 5th grade classrooms in 9 schools. At T1, data were collected through parent report on participants' BMI. At T1 and T2, data were collected via child self report on weight-related victimization, negative body cognitions (body dissatisfaction, overconcern with weight) and internalizing symptoms (depression, anxiety) and via teacher report on internalizing symptoms (somatization, withdrawal, school avoidance). Data for the third time point (T3) were collected from 150 of these participants now in 7th or 8th grade. At T3, data were collected during home visits via self report on weight-related

victimization, both negative body cognitions, all five internalizing symptoms, and two negative health behaviors (disordered eating behavior, physical activity).

Analyses of bidirectional relations between T1 and T3 revealed significant cross-lag paths: 1) for both genders, positive bidirectional relations between BMI and weight-related victimization; and 2) for boys, earlier overconcern with weight predicting later anxiety, as well as positive bidirectional relations between overconcern with weight and somatization. No significant mediation effects emerged for models including negative body cognitions and internalizing symptoms. Auxiliary analyses revealed that weight-related victimization mediated the link between BMI and both physical activity and disordered eating. The importance of these findings on research on weight-related victimization and on clinical practice is discussed.

Chapter 1

INTRODUCTION

Obesity is the most prevalent health problem among American children and adolescents. Over one third of American adolescents are now considered either overweight (body mass index, or BMI, at or above the 85th percentile) or obese (BMI at or above the 95th percentile), with over 20% being obese (Ogden, Carroll, Kit, & Flegal, 2014)¹. Despite greater attention to this issue, rates of obesity in youth have remained stable over the past 10 years (Ogden et al., 2014).

Obesity has been linked to many youth problems, including health issues (e.g., Arens & Muzumdar, 2010; Bridger, 2009; Daniels, 2006; Hannon, Rao, & Arslanian, 2005), academic difficulties (e.g., Carey, Singh, Brown, & Wilkinson, 2015; Datar, Sturm, & Magnabosco, 2004; Taras & Potts-Datema, 2005), neurocognitive deficits (e.g., Liang, Matheson, Kaye, & Boutelle, 2014; Wang, Chan, Ren, & Yan, 2016), and psychosocial concerns (e.g., Datar & Sturm, 2006; Eisenberg, Neumark-Sztainer, & Story, 2003; Govey et al., 2016; Puhl & Luedicke, 2012). Degree of obesity also relates to outcomes, with higher BMI associated with greater dysfunction (e.g., Govey et al., 2016; Harrist et al., 2016). Although overweight and obese youth struggle in

¹ The lack of correspondence between BMI percentiles and distribution of obesity (e.g., 20% of adolescents are at or above the 95th percentile) is due to the continued use of outdated norms for BMI percentile.

many areas, peer relations is an area of particular concern.

Children and adolescents spend substantial time with their peers, with adolescents estimated to spend almost twice as much time with peers as parents (Csikszentmihalyi & Larson, 1984). Poor peer relations predict lower academic functioning (e.g., Buhs & Ladd, 2001; Schwartz, Lansford, Dodge, Pettit, & Bates, 2013), externalizing behaviors such as aggression and delinquency (e.g., Bierman, Kalvin, & Hienrichs, 2015; Coie, Lochman, Terry, & Hyman, 1992; Ladd, 2006), and internalizing symptoms such as depression and anxiety (e.g., Bierman et al., 2015; Pedersen, Vitaro, Barker, & Borge, 2007; van Lier & Koot, 2010). In contrast, youth who are well-liked and accepted within the peer group are more likely to experience positive academic and psychosocial outcomes (e.g., Erath, Flanagan, & Bierman, 2008; Kingery, Erdley, & Marshall, 2011). Therefore, understanding the peer relations of obese and overweight youth could provide significant insight into other aspects of these youth's functioning.

The goal of the current study was to test a longitudinal serial mediation model which proposes that weight-related peer victimization mediates the associations between obesity and a subsequent string of negative outcomes (see Figure 1) across the span of middle childhood (4th or 5th grade) to adolescence (7th or 8th grade). In particular, we hypothesized that youth with higher BMI are more likely to experience weight-related victimization and that this victimization sets off a chain of events including increased negative body cognitions, increased internalizing symptoms, and increased negative health behaviors which ultimately feeds back to adversely impact

youth's BMI. Within this goal, we examined bidirectional effects within pairs of constructs as well as the full model itself. We begin with a review of the literature supporting each step of the longitudinal model.



Figure 1 Full serial mediation model

Obesity and Victimization

Although obesity is increasingly common in America, obese people are significantly stigmatized, a phenomenon which has been demonstrated in both adults (Puhl & Brownell, 2001) and youth (Puhl & Latner, 2007). In fact, stigmatization of obese youth has worsened in recent decades (Latner & Stunkard, 2003). Children exhibit negative attitudes toward overweight and obese peers as young as age 3 (Cramer & Steinwert, 1998), and these attitudes persist into middle childhood (Kraig & Keel, 2001) and adolescence, with high school students perceiving overweight status as a primary reason for peer victimization (Puhl, Luedicke, & Heuer, 2011). Stigmatization manifests in the marginalization of overweight and obese youth, who are often on the periphery of their social networks and who receive fewer friendship nominations and are rated as less popular than their normal-weight peers (Cramer & Steinwert, 1998; Harrist et al., 2016; Strauss & Pollack, 2003; Valente, Fujimoto,

Chou, & Spruijt-Metz, 2009; Wang, Houshyar, & Prinstein, 2006; Zeller, Reiter-Purtill, & Ramey, 2008).

Beyond marginalization, overweight and obese youth report more peer victimization than normal-weight peers (Janssen, Craig, Boyce, & Pickett, 2004; Lumeng et al., 2010; Van den Berg, Neumark-Sztainer, Eisenberg, & Haines, 2008), including physical victimization (Fox & Farrow, 2009; Janssen et al., 2004), verbal victimization (Fox & Farrow, 2009), and relational victimization (Janssen et al., 2004; Pearce, Boergers, & Prinstein, 2002). Although victimization takes many forms, it is often related to these youth's weight specifically (Gray, Kahhan, & Janicke, 2009; Janssen et al., 2004; Pearce et al., 2002; Puhl, Peterson, & Luedicke, 2013; Van Geel, Vedder, & Tanilon, 2014). The victimization of overweight/obese youth crosses gender lines (see Van Geel et al., 2014 for a meta-analysis) and racial/ethnic categories (Van den Berg et al., 2008). Victimization may worsen as youth become increasingly obese, with youth with the highest BMIs experiencing the worst peer outcomes (Harrist et al., 2016). Furthermore, weight-related victimization is chronic, with 78% of adolescents in a weight-loss program reporting the experience over one year and 36% over 5 years (Puhl et al., 2013).

Complicating this literature is evidence that the link between victimization and obesity is bidirectional. Although obesity leads to youth being teased about their weight, weight-related victimization prospectively predicts increased BMI as well (e.g., Haines, Neumark-Sztainer, Wall, & Story, 2007; Quick, Wall, Larson, Haines, & Neumark-Sztainer, 2013). This relation may be moderated by gender; two studies

found that general victimization was associated with later increases in BMI for girls only (Adams & Bukowski, 2008; Qualter et al., 2015). These bidirectional relations persist into adulthood, with victimization in middle childhood and early adolescence predicting increased BMI at age 45, even when controlling for both childhood and adult risk factors (Takizawa, Danese, Maughan, & Arseneault, 2015).

Evidence for Adding Negative Body Cognitions to the Model

The term negative body cognitions refers to negative thoughts that youth have about their own bodies and physical shapes. Two of these cognitions, body dissatisfaction and overconcern with weight, have been shown to be distinct constructs related to different outcomes (Allen, Byrne, McLean, & Davis, 2008) and will be the focus of the review to follow.

Obesity and Negative Body Cognitions

Body dissatisfaction is defined as a negative attitude toward one's own weight and/or shape (Goldschmidt, Aspen, Sinton, Tanofsky-Kraff, & Wilfley, 2008). The construct is observed across ages and genders and may increase with age (Allen et al., 2008; Calzo et al., 2012; Goldfield et al., 2010). However, one study found that this relation was moderated by gender, with girls' body dissatisfaction at age 13 better predicted by objective weight at age 10, but boys' body dissatisfaction better predicted by perception of being heavy (Lunde, Frisen & Hwang, 2007).

Overconcern with weight is defined as a preoccupation with one's own size or

weight (Allen et al., 2008). Overconcern with weight increases with BMI; however, in older girls, the association may be attenuated due to increased weight concerns among normal-weight girls (Calzo et al., 2012). Despite some studies linking overconcern with weight to objective size, at least one study has shown that these thoughts may be more linked to psychosocial variables (self-esteem, internalization of thin ideal) than to objective weight (Allen et al., 2008).

Several studies suggest that the link between BMI and negative body cognitions is bidirectional. Although obesity is prospectively associated with negative body cognitions over time, both increased body dissatisfaction and greater weight concerns also predict later overweight status for both boys and girls (Haines et al., 2007). In fact, adolescent girls with higher body dissatisfaction gained more weight over a 5-year period than girls who were more satisfied (Van den Berg & Neumark-Sztainer, 2007). Furthermore, over 1 and 6 year periods, perceiving body size as overweight (regardless of weight status) and overestimating body size were both prospectively linked to increased risk of onset of being overweight/obese, while perceiving body size as skinny or underestimating body size have both been linked to decreased risk of onset of being overweight/obese (Duong & Roberts, 2014; Liechty & Lee, 2015).

Victimization and Negative Body Cognitions

Several investigations have related weight-related victimization to body dissatisfaction. Peer teasing has been associated with greater body dissatisfaction in

late elementary school (Lunde, Frisen, & Hwang, 2006; Vander Wal & Thelen, 2000) and prospectively from elementary school into adolescence for girls (Lunde et al., 2007). One retrospective study found that increased reports of weight-related victimization in childhood were associated with higher body dissatisfaction into adulthood (Rosenberger, Henderson, Bell, & Grilo, 2007). In fact, for overweight preadolescents, weight-related victimization uniquely predicts body dissatisfaction, even when controlling for actual body size and victimization unrelated to weight (Nelson, Jensen, & Steele, 2011).

Greater weight-related teasing has also been linked to increased overconcern with weight both concurrently (Sinton et al., 2012; Vander Wal & Thelen, 2000) and retrospectively (Rosenberger et al., 2007). In one twin study examining genetic and environmental influences on overconcern with weight, the authors suggested that peer teasing may be an especially significant environmental influence from ages 13 to 15, a time when overconcern with weight may be most likely to increase (Wade et al., 2013). For boys specifically, appearance-related exclusion has been linked to greater concern about weight (Helfert & Warschburger, 2011). To some extent, the adolescent's reaction to teasing may play a role, as adolescents who reported being upset by teasing placed greater value on thinness and based their self-assessments more on weight and shape (Libbey, Storey, Neumark-Sztainer, & Boutelle, 2008). Beyond the individual level, at the school level, greater weight-related victimization predicts greater body dissatisfaction for adolescent girls, which the authors suggest may indicate an increased internalization of the thin ideal in a school culture (Lampard

et al., 2014).

Victimization as a Mediator between Obesity and Negative Body Cognitions

General victimization has been shown to mediate the relation between early-onset overweight classification and children's later desire to be thinner (Pryor et al., 2016). To our knowledge, no studies to date outside of our lab have investigated weight-related victimization specifically as a mediator between obesity and negative body cognitions. In our lab's work with a 4th and 5th grade sample, weight-related victimization partially mediated the relation between BMI and both body dissatisfaction and overconcern with weight (Bookhout et al., 2018).

Evidence for Adding Internalizing Symptoms to the Model

In this section, we consider how the constructs of obesity, victimization, and negative body cognitions may contribute to increases in youth's internalizing symptoms.

Obesity and Internalizing Symptoms

A substantial literature suggests that obesity contributes to internalizing psychopathology among children and adolescents.

Depression

Obese youth experience higher rates of depression than their peers (Bell et al.,

2011; Boutelle, Hannan, Fulkerson, Crow, & Stice, 2010; Csábi, Tényi, & Molnár, 2000). Among obese youth, higher BMI is associated with greater depression (Thompson, Phillips, McCracken, Thomas & Ward, 2013). In early childhood, the relation to depression was particularly salient for children in the 99th percentile of BMI or higher (Harrist et al., 2016).

A recent literature review suggests that there is likely a bidirectional relation between obesity and depression in youth (McBride & Cole, 2014). Indeed, several studies have found prospective links from depression to obesity (Martin-Storey & Crosnoe, 2015; Roberts & Duong, 2013; Stunkard, Faith, & Allison, 2003). However, race/ethnicity may moderate these relations for girls, such that both the prospective associations from obesity to depression and vice versa emerges for White but not Black or Hispanic adolescent girls (Anderson et al., 2011).

Anxiety

Obese youth may also experience more anxiety than their peers (Buddeburg-Fisher, Klaghofer, & Reed, 1999; Roberts & Duong, 2016), with higher BMI being associated with greater anxiety among obese children (Thompson et al., 2013). The chronicity of high BMI also is linked to anxiety, such that girls with a stable high BMI over time display more anxiety than girls who transition from normal weight to overweight (Datar & Sturm, 2006). A few studies, however, have found no link between youth obesity and anxiety (Tanofsky-Kraff et al., 2004; Zeller, Saelens, Roehrig, Kirk, & Daniels, 2004). One possible explanation for these equivocal

findings is that obesity may be linked to social anxiety specifically (Lanza, Echols, & Graham, 2013; Rancourt et al., 2014; Thompson et al., 2013).

Fewer studies have examined bidirectional relations between obesity and anxiety. One study investigated the bidirectional relation between obesity and a combination of anxiety and emotional distress, finding bidirectional relations in girls and a unidirectional relation from obesity to this variable in boys (Ames, Wintre, & Flora, 2015). In contrast, one prospective study of adolescents suggests that, for males only, although weight status did not increase future risk of anxiety, anxiety did increase future risk of obesity (Roberts & Duong, 2016).

Withdrawal

Fewer studies have been conducted on the relation between obesity and social withdrawal. Social withdrawal refers to a child's own self-isolation from the peer group, as opposed to isolation through peer processes such as rejection (Rubin, Coplan, & Bowker, 2009). One study suggests that youth who are chronically overweight or obese display more social withdrawal over time than youth who are never/rarely overweight/obese or who become overweight/obese later in childhood (Xie, Ishibashi, Lin, Peterson, & Susman, 2013). No studies to date have examined the bidirectional relations between obesity and social withdrawal.

Somatization

Similarly, youth who are chronically overweight/obese display more

somatization over time than children who are never/rarely overweight or obese or who become overweight/obese later in childhood (Xie et al., 2013). As early as first grade, children in the 95th percentile of BMI or higher have more teacher-reported somatization than peers (Harrist et al., 2016). Furthermore, perceptions of being overweight after the transition to puberty have been linked to increased somatic complaints for both genders (Ge, Elder, Regnerus, & Cox, 2001).

School Avoidance

Obese youth are absent from school more days than their normal-weight peers (Carey et al., 2015; Datar & Sturm, 2006; Echeverria, Velez-Valle, Janevic, & Prystowsky, 2014; Geier et al., 2007; Shore et al., 2008). This association does not appear to be solely explained by increased health concerns among obese youth; in one large population-based study, the result emerged even when accounting for increased health concerns and health care utilization among obese youth (Carey et al., 2015). Thus, it is possible that obese youth may sometimes avoid school for social or emotional reasons.

Victimization and Internalizing Symptoms.

Most of the five internalizing symptoms reviewed above have been linked to peer victimization as well as obesity, and this literature will be reviewed below.

Depression

Victimization about weight has been associated with depression in both general and overweight youth (Eisenberg et al., 2003; Libbey et al., 2008; Storch et al., 2007). In adolescents, weight-related teasing has been linked to depressive symptoms, suicidal ideation, and suicide attempts even when controlling for actual weight (Eisenberg et al., 2003). Moderation effects have been found, with one study revealing a negative relation between adolescents' perceptions of their own popularity and depression among chronically overweight girls and among youth with an earlier history of obesity who were no longer overweight, but not among youth who had never been overweight (Martin-Storey & Crosnoe, 2015). In contrast, several investigations have documented that stronger peer relationships may mitigate the negative effects of obesity on depression, with increased peer social support being related to quality of life (Herzer, Zeller, Rausch, & Modi, 2011) and reduced depression (Lim et al., 2011).

Anxiety

To date, only two studies have examined the direct relation between weight-related victimization and anxiety. One study found that frequent weight-related teasing by family and peers was associated with greater anxiety in adolescents (Libbey et al., 2008). The second study suggested that, although weight-related victimization increases fear of negative evaluation over time, the reciprocal pattern is not supported (Rancourt et al., 2014).

Withdrawal

Youth who are socially withdrawn typically experience peer victimization and rejection (Rubin et al., 2009), and this association extends to weight-related victimization. Specifically, among overweight youth, teasing has been associated with a preference for isolative sedentary activities (Hayden-Wade et al., 2005).

Somatization

General victimization has been linked to somatization (e.g., Haltigan & Vaillancourt, 2014). However, no studies to date have directly linked weight-related victimization and somatization.

School Avoidance

Only one study of the direct association between weight-related victimization and school avoidance has been conducted. In this study of high school students, weight-based victimization was linked to school avoidance such that the odds of skipping school increased by 5% for each weight-based teasing incident (Puhl & Luedicke, 2012).

Negative Body Cognitions and Internalizing Symptoms

In several studies, both body dissatisfaction and overconcern with weight predict increased risk for depression (Biby, 1998; Cromley et al., 2012; Goldschmidt, Wall, Choo, Becker, & Neumark-Sztainer, 2016; Goldschmidt, Wall, Loth, &

Neumark-Sztainer, 2015; Hadigan & Walsh, 1991; Newman, Sontag, & Salvato, 2006). Furthermore, three investigations have also found links between body dissatisfaction and anxiety (Cromley et al., 2012; Newman et al., 2006), with one study focusing on increased fear of negative evaluation, a component of social anxiety (Vander Wal & Thomas, 2004). Finally, associations between body dissatisfaction and somatization have emerged in two studies, with one using a Native American sample (Biby, 1998; Newman et al., 2006). To date, however, no studies have examined direct associations between negative body cognitions and social withdrawal or school avoidance in child or adolescent samples, although some work has emerged in adult samples for withdrawal (Marshall, Lengyel, & Utioh, 2012).

Mediation of the Links between Obesity, Victimization, Negative Body Cognitions, and Internalizing Symptoms

The previous sections outlined evidence for direct relations between internalizing symptoms and the three constructs of obesity, victimization, and negative body cognitions. Beyond this work, a few studies have examined mediating relations between subsets of these constructs including internalizing symptoms. In a study conducted in our lab using a 4th- and 5th-grade sample, weight-related victimization mediated the relations between obesity and depression as well as withdrawal, but did not mediate the relations between obesity and anxiety, somatization, or school avoidance (Bookhout et al., 2018). In a study with adolescent girls, weight-related victimization was also found to mediate the relation between obesity and depression

(Thompson, Coover, Richards, Johnson, & Cattarin, 1995). Body dissatisfaction has also been used as a mediator, with investigations suggesting that it mediates the association between BMI and both emotional well-being (Gall et al., 2016) and depressed mood (Benas & Gibb, 2007; Mond, van den Berg, Boutelle, Hannan, & Neumark-Sztainer, 2011). Finally, a recent study examined both general victimization and desire to be thinner as mediators between obesity and both depression and anxiety; results differed across children with different weight trajectories, such that both victimization and a desire to be thinner mediated the relations for children whose overweight status had an early onset, whereas only desire to be thinner mediated the relations for children with a later-onset overweight trajectory (Pryor et al., 2016).

Evidence for Adding Negative Health Behaviors to the Model

In this section, we will consider how the four constructs reviewed above (obesity, victimization, negative body cognitions, internalizing symptoms) are linked to negative health behaviors both directly and in mediation models. Two categories of health behaviors will be considered, disordered eating behaviors and physical activity.

Obesity and Negative Health Behaviors

The literature linking obesity to negative health behaviors is voluminous and will be reviewed here only in brief.

Disordered Eating Behaviors

Obesity has been associated with a variety of disordered eating behaviors and unhealthy weight control behaviors in youth, including binge eating (Lourenco et al., 2008; Pasold, McCracken, & Ward-Begnoche, 2014), skipping meals (Stensland, Thoresen, Wentzel-Larsen, & Dyb, 2015), dietary restraint (Goldfield et al., 2010), starving for more than one day, taking diet pills, taking laxatives, and inducing vomiting (Shisslak et al., 2006). Furthermore, engagement in unhealthy weight-control behaviors predicts increases in weight status over time (Haines et al., 2007; Liechty & Lee, 2015).

Physical Activity

In line with general wisdom, the literature supports the notion that obesity and physical activity are negatively related, with multiple studies suggesting youth who are overweight and obese engage in more sedentary behaviors and fewer active behaviors than their normal-weight counterparts (e.g., De Bourdeaudhuij et al., 2005; Hills, King, & Armstrong, 2007; Nesbit, Kolobe, Sisson, & Ghement, 2014). In prospective studies, this relation has been shown to be bidirectional, with increased obesity reducing later physical activity, and reduced physical activity increasing later obesity (Pietiläinen et al., 2008).

Victimization and Negative Health Behaviors

A small body of literature links weight-related victimization directly to

negative health behaviors.

Disordered Eating Behaviors

Among adolescents, greater victimization has been connected to increased negative health behaviors in three studies. In the two studies, greater weight-related teasing predicted more disordered eating thoughts and behaviors (Hutchinson, Rapee, & Taylor, 2010; Libbey et al., 2008). In the second study, when youth were motivated to lose weight due to victimization, rather than for positive reasons such as improving athletic performance, they were more likely to attempt weight loss through unhealthy behaviors such as skipping meals or starving (Brown, Skelton, Perrin, & Skinner, 2016).

Physical Activity

Peer victimization has also been linked to reduced physical activity (Storch et al., 2007) and strongly predicts youth's report of increased barriers to engaging in physical activity (Gray, Janicke, Ingerski, & Silverstein, 2008). Furthermore, teasing during physical activity has been prospectively associated with reduced engagement in physical activity one year later, regardless of weight status (Jensen, Cushing, & Elledge, 2014). Among college students, experiencing weight-related stigma has been associated with increased desire to avoid exercise, which was then associated with less frequent exercise (Vartanian & Shaprow, 2008). In contrast, perceived social support has been linked to increases in physical activity (Bergh et al., 2011), suggesting that a

positive peer environment may encourage overweight and obese youth to engage in more active behaviors.

Negative Body Cognitions and Negative Health Behaviors

Next, we review the small literature connecting youth's negative body cognitions to their negative health behaviors.

Disordered Eating Behaviors

Negative body cognitions are a risk factor for several types of disordered eating (Goldschmidt et al., 2015, 2016). More specifically, both body dissatisfaction and overconcern with weight and shape have been linked to dietary restraint and binge eating in youth (Allen et al., 2008; Sonnevile et al., 2012; Sonnevile et al., 2015). Furthermore, body dissatisfaction relates to dieting, unhealthy weight control behaviors, and reduced physical activity (Lampard et al., 2016), even when controlling for BMI (Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006). Body dissatisfaction may moderate the relation between BMI and unhealthy weight control behaviors, such that the relation is stronger for those with greater body dissatisfaction (Vander Wal, 2012).

Physical Activity

Negative body cognitions have also been linked to reductions in physical activity. One review found that negative body image correlated with decreased

participation in physical activity across studies, though the article noted possible moderation effects by gender and age such that the effect was most common in adolescent girls (Biddle, Atkin, Cavill, & Foster, 2011). Furthermore, among a sample of girls who had experienced weight-related victimization, those who exhibited body dissatisfaction were less physically active than those who did not (Jensen & Steele, 2009).

Internalizing symptoms and negative health behaviors

Internalizing symptoms have also been linked to negative health behaviors, and this literature will be summarized below.

Disordered Eating Behaviors

Depression and anxiety, in particular, are well-documented comorbidities of disordered eating in clinical samples (e.g., Shapira & Courbasson, 2011; Swinbourne et al., 2012; Touchette et al., 2011). These constructs have also been extensively linked in non-clinical samples. Longitudinally, depressive symptoms predict later disordered eating (Goldschmidt et al., 2015), and concurrently, fear of negative evaluation, considered a sub-construct of social anxiety (La Greca & Lopez, 1998), relates to disordered eating attitudes and behaviors (Vander Wal & Thomas, 2004). Depression and anxiety have also been examined in concert with several types of disordered eating behaviors in overweight and obese youth, with findings suggesting that depression and anxiety may be particularly associated with emotional eating and

binge eating, as opposed to other behaviors such as eating in response to external cues (Pauli-Pott, Becker, Albayrak, Hebebrand, & Pott, 2013). One study suggested that weight status might moderate the type of internalizing symptoms associated with disordered eating, with somatic symptoms linked to disordered eating in normal-weight girls and anxiety related to disordered eating in overweight girls (Cruz-Sáez, Pascual, Salaberria, & Echeburúa, 2015). Finally, in one retrospective study, disordered eating was associated with social withdrawal and isolation (Corcos et al., 2000).

Physical Activity

Physical activity has been negatively linked to depression in youth, with longitudinal studies establishing bidirectional associations such that depression and physical activity prospectively predicted each other (Jerstad, Boutelle, Ness, & Stice, 2010; Stavrakakis, de Jonge, Ormel, & Oldehinkel, 2012). Indeed, in one weight-loss study in adolescents, improvements in internalizing symptoms predicted improvements in physical activity level as opposed to reductions in weight (Fenner, Howie, Davis, & Stracker, 2016). Furthermore, physical activity has been negatively associated with both anxiety (McMahon et al., 2017; Shepherd, Krägeloh, Ryan, & Schofield, 2012) and somatization (Janssens, Oldehinkel, Bonvanie, & Rosmalen, 2014).

Mediation of the Links between Obesity, Victimization, Negative Body Cognitions, Internalizing Symptoms, and Negative Health Behaviors

While the previous sections reviewed the literature linking negative health behaviors directly to each of the other constructs in the model, in this section, we will review those studies investigating mediating relations between subsets of these constructs including negative health behaviors. Two cross-sectional studies have found that depression or negative affect (especially about teasing) mediated the association between BMI and disordered eating or unhealthy weight control behaviors (Gerke et al., 2013; Vander Wal, 2012). In addition, one investigation revealed that social withdrawal, or lower time spent with friends, mediated the relation between obesity and physical activity in the form of both increased television viewing time and decreased physical activity (Vandewater, Park, Hebert, & Cummings, 2015). A fourth study linked body dissatisfaction to bulimic eating behaviors through the mediator of negative affect (Hutchinson et al., 2010). Finally, several investigations suggest that the longitudinal association between weight-related victimization and increased weight gain over time is mediated by depression (Rosenthal et al., 2015), decreased physical activity (Jensen & Steele, 2009), and unhealthy weight control behaviors (e.g., Hayden-Wade et al., 2005; Neumark-Sztainer et al., 2002, 2007).

Goals

The overarching goal of the proposed study was to examine longitudinal relations among the constructs reviewed above across the time span of middle

childhood (T1, beginning of 4th or 5th grade; T2, end of 4th or 5th grade) to adolescence (T3, 7th or 8th grade). This goal was separated into two parts, one focused on bidirectional relations between pairs of constructs and the second emphasizing the full serial mediation model depicted in Figure 1.

Bidirectional Influences

As reviewed above, the nature of bidirectional relations between certain pairs of constructs in the model has been well-established (BMI and negative body cognitions; BMI and depression; BMI and physical inactivity; depression and physical inactivity). However, for other pairs of constructs, this literature is less developed, especially for the transition from middle childhood to adolescence, and these questions will form the basis for this sub-goal of the current study. Of note, we did not measure negative health behaviors at T1/T2, and therefore are not able to run bidirectional analyses including these constructs. Hypothesis 1 stated that bidirectional relations would emerge for each pair of constructs tested.

Reciprocal relations with BMI (Figure 2)

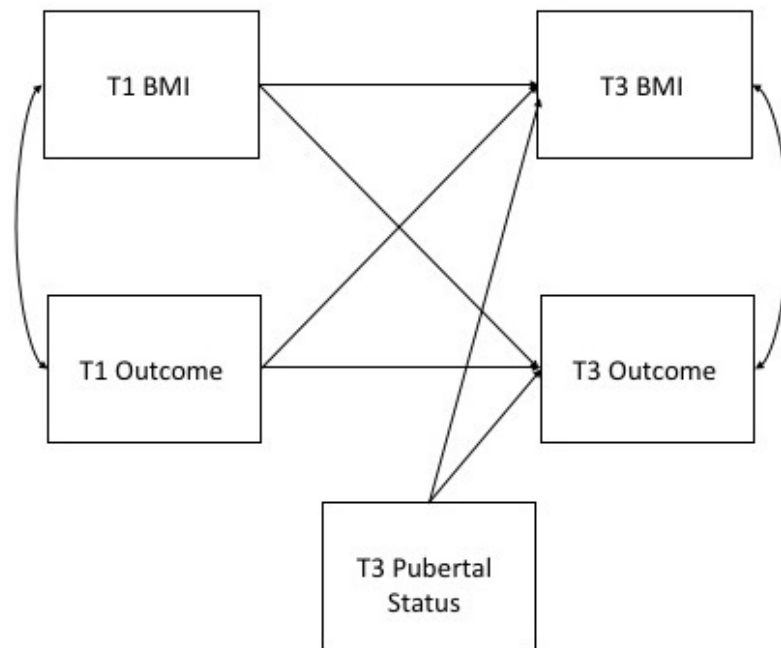


Figure 2 Bidirectional model from BMI to outcome

Weight-related Victimization

First, we examined the reciprocal relations between BMI and weight-related victimization. Only two studies have supported this link in adolescence (Haines et al., 2007; Quick et al., 2013), and neither of these studies examined the relation over the transition from middle childhood to early adolescence or used a comprehensive measure of weight-related victimization.

Internalizing Symptoms

Next, we examined the reciprocal relations between BMI and internalizing

symptoms other than depression. Of these symptoms, anxiety is the only one for which bidirectional relations with BMI have been examined, and those few studies revealed inconsistent findings. Although one study found a bidirectional relational for girls only (Ames et al., 2015), the second study found a prospective relation from anxiety to obesity for boys only (Roberts & Duong, 2016). No research has yet been conducted on the bidirectional relations between BMI and social withdrawal, BMI and somatization, or BMI and school avoidance.

Reciprocal Relations with Weight-related Victimization (Figure 3)

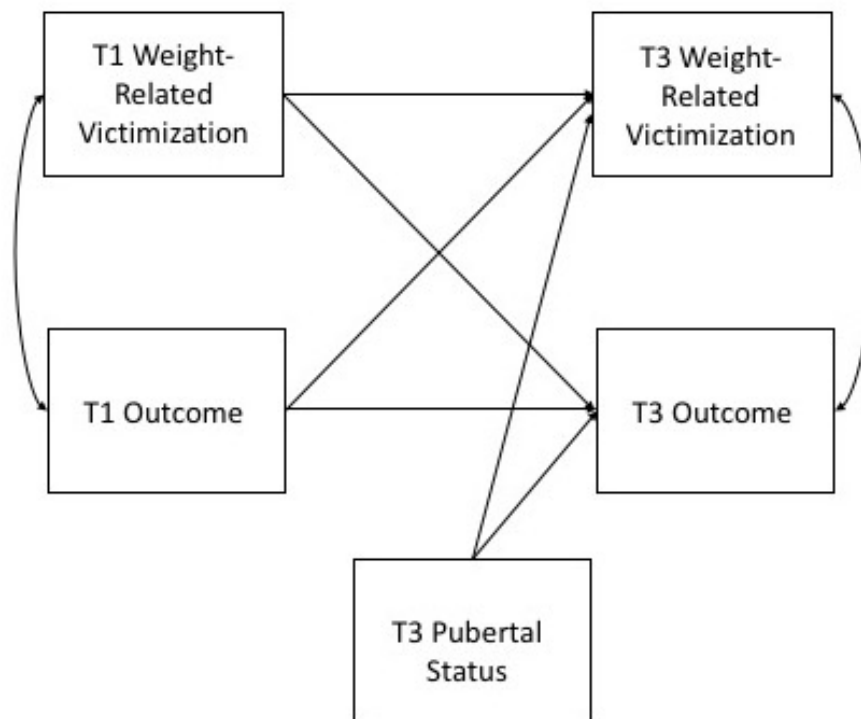


Figure 3 Bidirectional model from weight-related victimization to outcome

Negative Body Cognitions

Third, we examined bidirectional associations between weight-related victimization and negative body cognitions. Although no studies have directly investigated this question, two studies have suggested that negative body cognitions predict weight-related victimization by proposing mediation models in which either body dissatisfaction was the predictor and victimization was the mediator (Sutter, Nishina, & Adams, 2015) or body dissatisfaction was the mediator and victimization was the outcome (Fox & Farrow, 2009). In addition, one study found bidirectional associations between negative body cognitions and social status (Rancourt & Prinstein, 2010).

Internalizing Symptoms

Fourth, we investigated reciprocal relations between weight-related victimization and internalizing symptoms. Although bidirectional relations between general victimization unrelated to weight and internalizing symptoms have been well-explored (e.g., depression: Kendrick, Jutengren, & Stattin, 2012; Rose & Tynes, 2015; Tran, Cole, & Weiss, 2012; anxiety: Rose & Tynes, 2015; social anxiety: Ranta, Kaltiala-Heino, Frojd, & Marttunen, 2013; Siegel, La Greca, & Harrison, 2009; van den Eijnden, Vermulst, van Rooij, Scholte, & van den Mheen, 2014), no studies to date have addressed the topic of reciprocal relations between weight-related victimization and internalizing symptoms.

Reciprocal Relations between Negative Body Cognitions and Internalizing Symptoms (Figure 4)

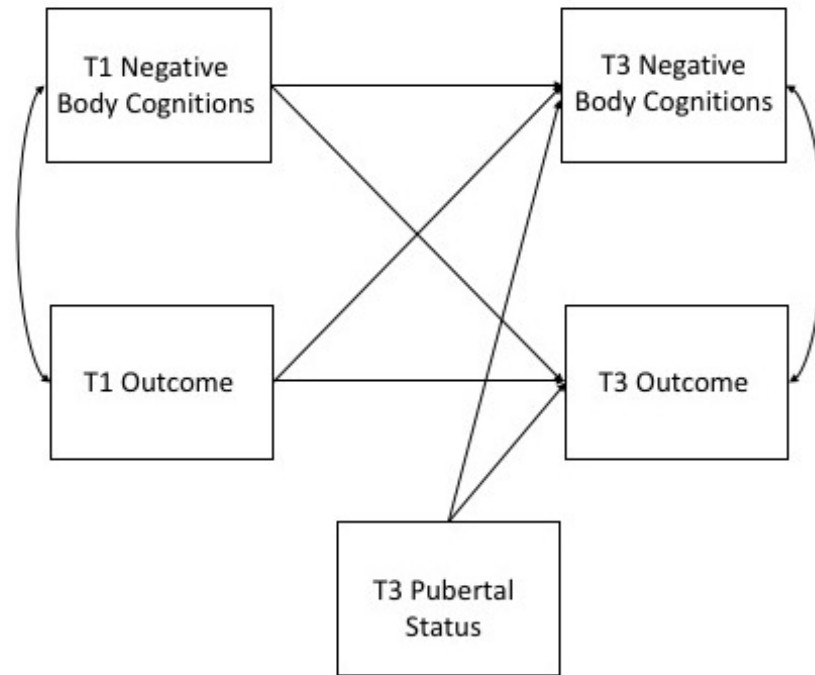


Figure 4 Bidirectional model from negative body cognitions to internalizing symptoms

Finally, we explored bidirectional associations between negative body cognitions and internalizing symptoms. No studies to date have addressed this question in youth. In one study conducted in an undergraduate sample, fear of negative evaluation, a component of social anxiety, was shown to have a reciprocal relation with body dissatisfaction (DeBoer et al., 2013).

Full Model

The literature reviewed above illustrates the complex relations between BMI, weight-related victimization, negative body cognitions, internalizing symptoms, and negative health behaviors. Various studies have examined subsets of these constructs, and in combination, these investigations provide support for the conceptual model depicted in Figure 1. However, to date, no single study has investigated all of these constructs simultaneously. Here, we included all constructs reviewed above in one investigation of the transition from middle childhood to adolescence and tested the model depicted in Figure 1 as fully as possible within the constraints of our sample size.

Of note, previous work has particularly neglected the importance of weight-related victimization in this model. A primary aim of the proposed study was to focus on this construct as a critical mediator between obesity and subsequent negative body cognitions, internalizing symptoms, negative health behaviors, and ultimately, increasing obesity. Notably, the one investigation that examined weight-related victimization and a subset of the other constructs reviewed here over the transition from middle childhood to adolescence (Project EAT) measured weight-related victimization using a single item rather than a well-validated multi-item scale (e.g., Haines et al., 2007; Libbey et al., 2008; Neumark-Sztainer et al., 2002, 2007; Van den Berg et al., 2008). Therefore, our investigation of the model depicted in Figure 1 across the transition from middle childhood to adolescence using a psychometrically sound measure of weight-related victimization fills a significant gap in the pediatric

obesity literature.

Although we would have liked to test the full model depicted in Figure 1, our sample size of 150 did not provide adequate power to do so. In our analyses, whenever possible, all T2 variables controlled for the effect of the same variable at T1, and all T3 variables controlled for the effects of the same variable at T1 and T2; exceptions include T3 negative health behaviors, which were not assessed at T1 or T2, and T3 BMI, which was assessed at T1 but not T2. However, if these controls are included, a sample size of 150 does not provide enough power to test the resulting full serial mediation model, because of the number of paths involved (see Figure 5 for a depiction of the complexity of the resulting model).

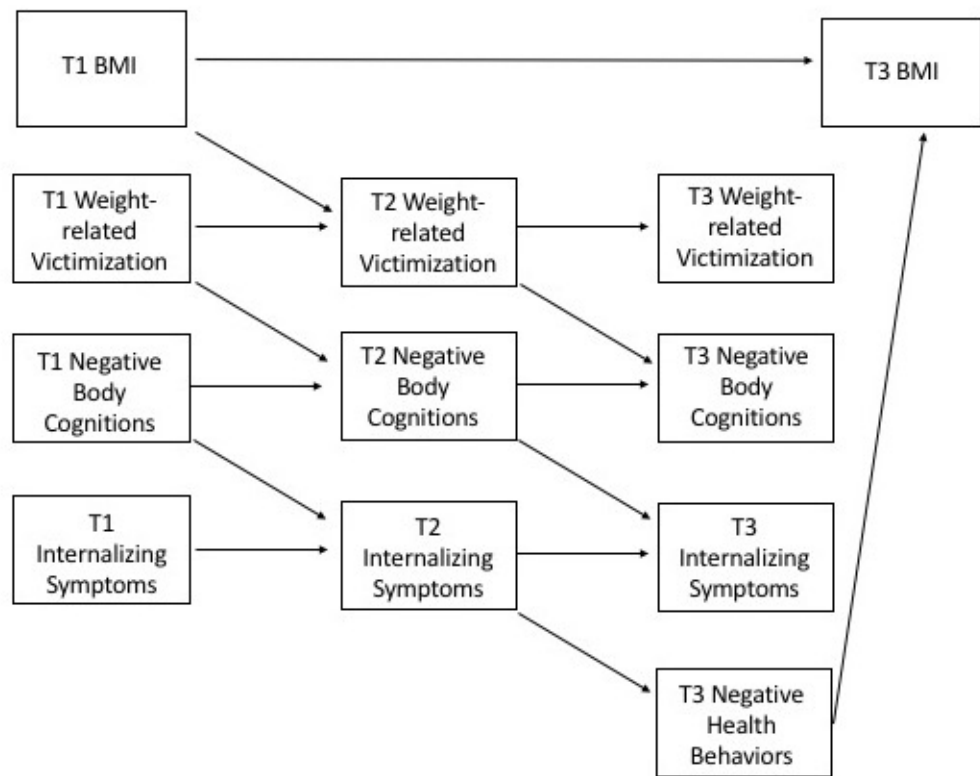


Figure 5 Full serial mediation model including controls for constructs assessed at previous time points

For this reason, we tested three separate models which segment the full model into smaller mediational pathways, while still maintaining the sequence of constructs depicted in Figure 1. Specifically, we first examined a model with BMI as the predictor at T1, weight-related victimization as the mediator at T2, and negative body cognitions as the outcome at T3 (Figure 6).

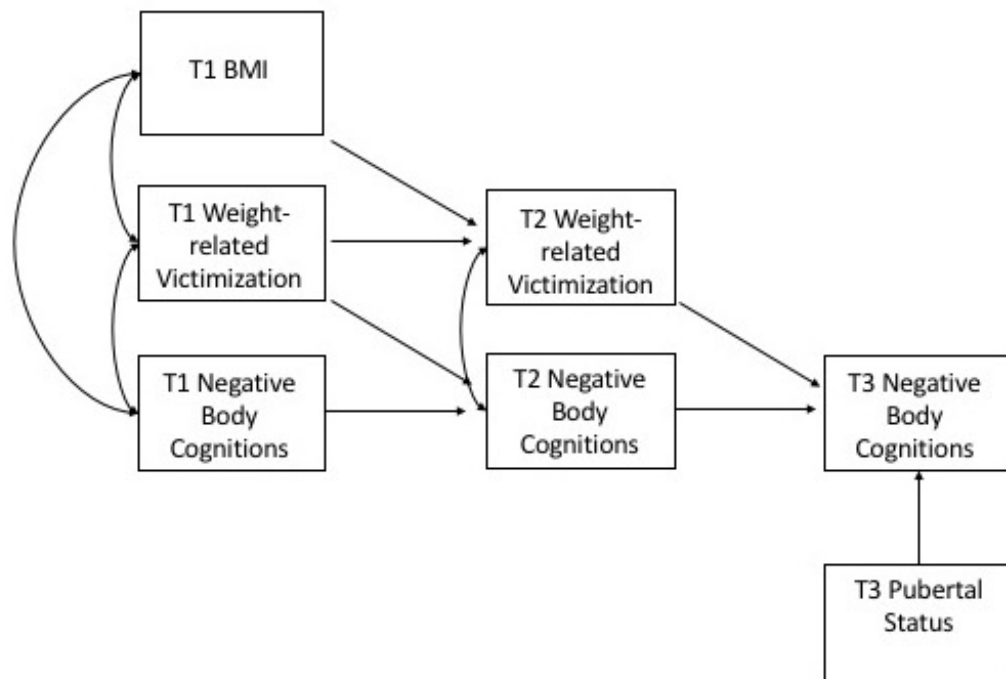


Figure 6 Mediation model linking T1 BMI, T2 weight-related victimization, and T3 negative body cognitions

Next, we examined a model with weight-related victimization as the predictor at T1, negative body cognitions as the mediator at T2, and internalizing symptoms as the outcome at T3 (Figure 7).

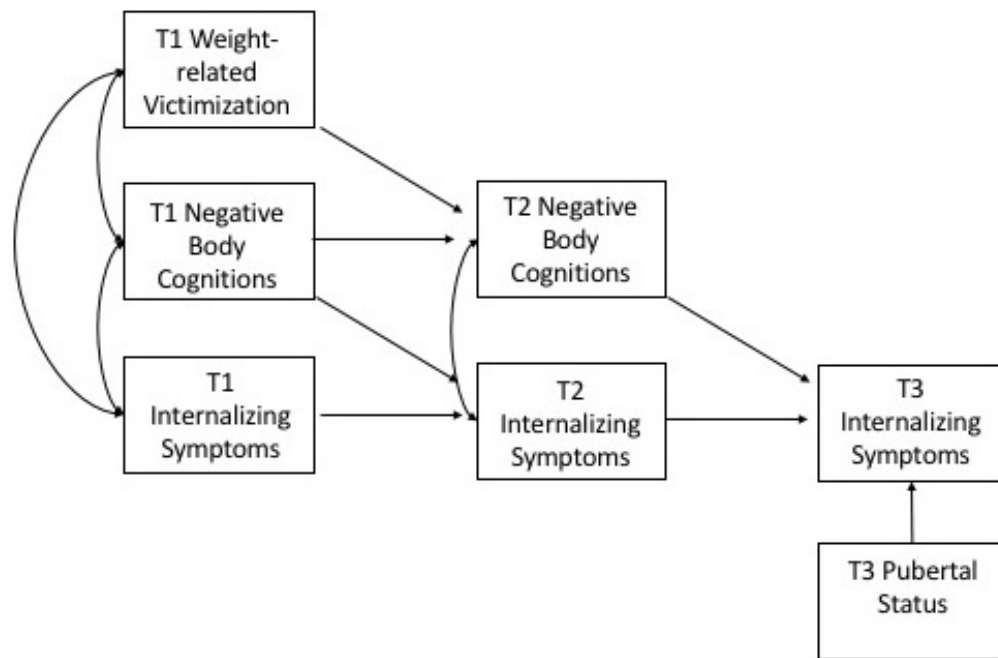


Figure 7 Mediation model linking T1 weight-related victimization, T2 negative body cognitions, and T3 internalizing symptoms

Finally, we examined a model with negative body cognitions as the predictor at T1, internalizing symptoms as the mediator at T2, and negative health behaviors as the outcome T3, with negative health behaviors concurrently predicting BMI also at T3 (Figure 8). Hypothesis 2 stated that each of these mediation models would be supported.

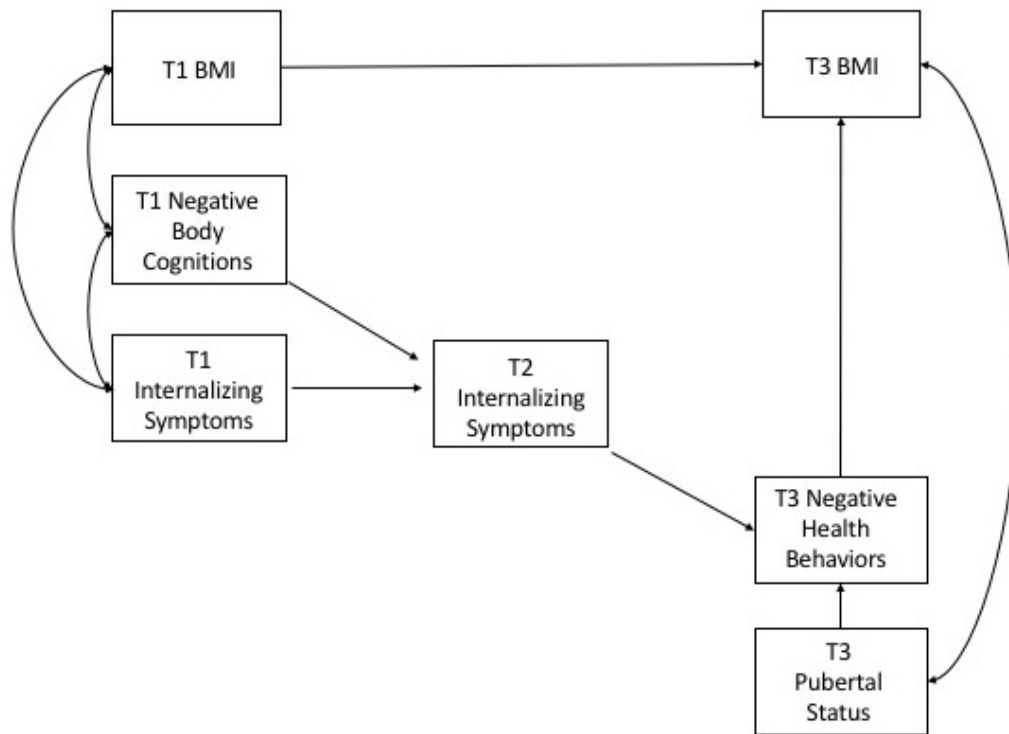


Figure 8 Mediation model linking T1 negative body cognitions, T2 internalizing symptoms, T3 negative health behaviors, and T3 BMI

Gender Moderation

We examined gender moderation in all bidirectional models and in the full model. However, we did not make specific hypotheses about gender moderation due to equivocal findings in previous literature. This equivocality spans both gender differences in single constructs and gender moderation of relations between constructs. In terms of single constructs, gender differences emerge consistently for some constructs [negative body cognitions (e.g, Ferreiro, Seoane, & Senra, 2014); depression (e.g., Allgood-Merten, Lewinsohn, & Hops, 1990; Holsen, Kraft, &

Roysamb, 2001); anxiety (Kashani, Orvaschel, Rosenberg, & Reid, 1989); somatization (Romero-Acosta et al., 2013); disordered eating (e.g., Ferreiro et al., 2014; Holm-Denoma, Hankin, & Young, 2014)], inconsistently for other constructs [weight-related victimization (e.g., Neumark-Sztainer et al., 2002; Van Geel et al., 2014); social withdrawal (e.g., Doey, Coplan, & Kingsbury, 2014; Rubin & Barstead, 2014); physical inactivity (e.g., Jensen & Steele, 2009; Mayorga-Vega & Vician, 2015; Yoo, Lounsbery, Bungum, & Gast, 2010)], and rarely for the remaining constructs [obesity (e.g., Ogden et al., 2014); school avoidance (e.g., Egger, Costello, & Angold, 2003)]. Regarding gender moderation of relations between constructs in the model, the association between obesity and weight-related victimization consistently emerges across genders (Lumeng et al., 2010; Van Geel et al., 2014). However, although the literature on gender moderation of the relations between other constructs in the model is vast, findings have been mixed, with some studies suggesting gender moderation (Ferreiro et al., 2014; Holsen et al., 2001; Kerremans, Claes, & Bijttebier, 2010; Puhl & Luedicke, 2012; Van Strien, Herman, & Verheijden, 2014) and others not (Hautala et al., 2008; Vaughan & Halpern, 2010). Given this inconsistency, gender moderation of the hypothesized models was conducted in an exploratory manner.

Chapter 2

METHODS

Overview

The current project used data collected at three time points. During the 2013-2014 academic year, data were collected through classroom visits in early fall (T1) and late spring (T2) from 1440 students in 74 4th and 5th grade classrooms in 9 schools. At T1, data were collected from parent report on participants' BMI. At T1 and T2, data were collected via child self report on weight-related victimization, negative body cognitions (body dissatisfaction, overconcern with weight) and internalizing symptoms (depression, anxiety) and via teacher report on internalizing symptoms (depression, anxiety, somatization, withdrawal, school avoidance). Data for the third time point (T3) were collected between December 2016 and June 2017 from 150 of these participants, who were now in the 7th or 8th grade. At T3, data were collected during home visits via adolescent self report on weight-related victimization, both negative body cognitions, all five internalizing symptoms, and negative health behaviors (disordered eating behavior, physical inactivity) and via parent report on family demographics and the adolescent's pubertal status (used as a covariate in analyses).

Participants

During the 2013-2014 school year, participants were recruited from 74 fourth- and fifth- grade classrooms in nine elementary schools in the Red Clay Consolidated School District. Parental permission letters were sent home to the parents of 1,910 children in these classrooms. Seventy-five percent of children received parental permission, provided child assent, and were present on either the day of data collection or a subsequent makeup day, resulting in an *N* of 1,440 children. Of these children, complete height, weight, and age data needed to calculate BMI were included on returned parental permission forms for 64% of the children (*N* = 924).

Of these 924 children, 764 of their parents provided permission to be recontacted for future studies. Of these 764 children, 682 had both self-report and teacher-report data from both T1 and T2. We recruited 150 of these 682 participants for T3 data collection.

Of the sample of 682 children, 48% were male. Parents identified children's race/ethnicity as 57% European American, 15% Latino American, 14% African American, 9% Asian American, and 5% more than once race. At T1, children ranged in age from 8-12 years, with a mean age of 10.09 years. Measures of socioeconomic status were not obtained for each child. However, the 9 schools varied widely in the percentage of children qualifying for free or reduced price lunch (range of 6-93%). Furthermore, detailed income information was obtained for a subsample of 106 families who participated in an additional study, with results suggesting that 13% fell at an income level below \$20,000, 31% fell between \$20,000 and \$50,000, 28%

between \$50,000 and \$100,000, and 28% over \$100,000.

In the recruited sample of 150, 43.3% were male. The recruited sample did not significantly differ from the rest of the sample by gender, $\chi^2 (1, N=682) = 1.854, ns$. Parents identified these children's race/ethnicity as 60.7% European American, 12.0% African American, 10.7% Latino American, 8.7% Asian American, and 8.0% more than one race. Again, the recruited sample did not significantly differ from the rest of the sample by race/ethnicity, $\chi^2 (5, N=682) = 2.837, ns$. Children ranged in age at T3 from 12-15 years, with a mean age of 13.63 years. In the recruited sample, by parent report, 2.7% fell at an income level below \$20,000, 14.7% fell between \$20,000 and \$50,000, 26.0% between \$50,000 and \$100,000, 27.3% between \$100,000 and \$150,000, and 28% over \$150,000. Two participants, or 1.3% of families, declined to report family income.

Recruitment Procedures

Initial recruitment for the T3 sample occurred via phone call, e-mail, or letter to the child's parent. For each e-mail or letter sent, a follow-up phone call was placed to review procedures in detail. Families who agreed to participate were scheduled for a two-hour home visit, during which both a parental permission form and a child assent form were completed.

For participants for whom initial contact information was no longer correct, we used freely available internet sources (e.g., www.peoplefinder.com, www.whitepages.com) as well as a subscription-based people-finding service

(Intelius) to locate families based on name, address, phone number, or e-mail address. To determine the order in which to email/mail/call participants, all participants were assigned a random number, which were then randomly sorted by an internet-based list randomizer. Participants were then contacted in the order generated by the randomizer.

By the end of recruitment, contact had been attempted with all 682 participants. Two families who were contacted and expressed interest were excluded due to having moved beyond reasonable driving distance. Otherwise, all interested participants who scheduled a visit and attended the visit participated in the study.

Data Collection Procedures

Classroom Visit Procedures at T1 and T2

A graduate student and approximately three undergraduate research assistants conducted 1-hour visits to each classroom to group-administer self-report measures in paper-and-pencil format. To protect confidentiality, children received a manila folder to stand upright on their desk as a “privacy shield.” The graduate student led the classroom through the data collection packet, explaining instructions on each individual page. The undergraduate research assistants circulated through the room answering questions, keeping children on task, and ensuring that privacy was maintained. In addition, undergraduate research assistants worked individually in a private setting with children requiring reading assistance. At the time of the classroom visit, teachers were provided access to an online system to complete teacher-report

measures about each child with parental permission. Classrooms were compensated with \$100 for supplies or activities at T1 and T2.

Home Visit Procedures at T3

Home visits were conducted by a graduate student and undergraduate research assistant. Visits occurred either in the participant's home, at a neutral location (e.g, a library), or within the Peer Relations Lab space at the University of Delaware, depending on family preference. Home visits were scheduled for two hours, but ranged in time from forty-five minutes to two hours and thirty minutes depending on the pace at which the adolescent worked. During each visit, the undergraduate assistant worked with the parent, while the graduate student worked with the adolescent in a separate room. At the conclusion of the home visit, adolescents and parents were debriefed and given the opportunity to ask questions. Parents and adolescents were each compensated with \$20 at the completion of the home visit.

To address literacy concerns, both parents and adolescents were offered the option to complete the questionnaires independently or to have the experimenter read the items aloud. When items were read aloud, parents and adolescents marked responses privately on a separate questionnaire, as literacy permitted, to reduce socially desirable responding and embarrassment.

Measures

Throughout the sections below, unless otherwise indicated, items were

averaged across the subscale such that higher scores indicate greater levels of the construct of interest.

BMI

Parent Report (T1) and Objective Measurement (T3)

At T1, children's weight, height, gender, and age were collected via parent report on permission letters. At T3, children's weight and height were assessed by experimenters during the home visit. Both height and weight were measured twice. If these measurements are discrepant, height and weight were measured a third time. There were no instances in which the third measurement was not concordant with either prior measurement, and the measurement with concordance was used in data analyses. Parents were asked to provide the child's birthdate. The date of the height/weight measurement was also recorded to provide an accurate age at which height and weight were measured.

BMI, which is a measure of weight adjusted for height, is often used to estimate excess body fat in comparison to overall weight (Barlow, 2007; Flegal, Tabak, & Ogden, 2006). However, in youth, BMI scores are converted into BMI percentile scores based on age and gender, as BMI changes with age and varies by gender in youth (Barlow, 2007). The CDC provides excel spreadsheet calculators that use height, weight, gender, birth date, and date of measurement to compute BMI percentile, and these calculators were used in this study (CDC, 2000). BMI percentile

was used as a continuous variable in analyses.

Weight-related Victimization

Self Report (T1, T2, T3)

Weight-related victimization was assessed using the 6-item General Weight Teasing subscale from the Perception of Teasing Scale, which uses a response scale ranging from *1 = not at all* to *5 = a whole lot* (Thompson, Cattarin, Fowler, & Fisher, 1995; Appendix A). This scale has strong internal consistency for both genders and for diverse racial/ethnic samples of 5th and 6th graders (Cronbach's $\alpha = .88$; Nelson et al., 2011), as well as for college women (Cronbach's $\alpha = .88$; Thompson et al., 1995). A review of weight-related victimization measures found that internal consistency for this measure across studies ranged from 0.88 to 0.96 and noted that this was the only measure of weight-related victimization consistently used with both children and adults, suggesting that it can be used across developmental levels (DePierre & Puhl, 2012). In the current study, internal consistency was .92 at T1, .93 at T2, and .94 at T3. Test-retest reliability from T1 to T2 was .59.

Body Dissatisfaction

Self Report (T1, T2, T3)

Body dissatisfaction was assessed using a Figure Rating Scale, in which same-

gender images ranging from very underweight to very overweight are provided, and the participant is asked to circle which image best resembles themselves (self-perceived body) and which image they most want to look like (desired body). At T1 and T2, body dissatisfaction was assessed using the Body Figure Perception Scale, in which children were presented with seven sketches of a same-gender child (Collins, 1991; Appendix B). In the current study, test-retest reliability from T1 to T2 was .60.

At Time 3, we used a Figure Rating Scale that better reflects adolescents' current physical development with 9 sketches of a same-gender adult (Stunkard, Sørensen, & Schulsinger, 1982; Appendix C). Although this measure was developed for adults, it has been used with adolescent participants as young as age 12 and 13 (e.g., Chaiton et al., 2009; Mendes, Araujo, Lopes, & Ramos, 2014; Yackobovitch-Gavan, Meshy-Tamir, Nagelberg, Phillip, & Meyerovitch, 2014). A study of the psychometrics of this measure in a Chinese adolescent sample with a mean age of 14.4 years found strong convergent validity with both weight and self-reported BMI, discriminant validity with health-related quality of life, and test-re-test reliability of 0.78 for girls and 0.72 for boys (Lo, Ho, Wong, Mak, & Lam, 2011).

For both measures, body dissatisfaction scores were calculated by subtracting the desired body image score from the self-perceived body image score. Thus, positive scores indicate that the participant identifies his/her desired body as smaller than his/her self-perceived body, and negative scores indicate that the participant identifies his/her desired body as larger than his/her self-perceived body. The more that the absolute value of the score deviates from 0, the greater the dissatisfaction in either

direction.

Overconcern with Weight

Self Report (T1, T2, T3)

At T1 and T2, overconcern with weight was assessed using 3 items from the 5-item Overconcern with Weight and Shape subscale of the McKnight Risk Factor Survey which uses a response scale from *1 = not at all* to *5 = a whole lot* (McKnight Investigators, 2003; Appendix D). Two items were dropped due to time constraints. At T3, the full 5-item subscale was used (Appendix E). In middle school girls, the measure demonstrated test-retest reliabilities of .57-.85 and Cronbach's $\alpha = .86$ (Shisslak et al., 1999). Internal consistency was also strong for racially diverse male and female adolescents, with Cronbach's α at least .74 for all racial/gender groups (Lynch, Heil, Wagner, & Havens, 2007). In the current study, Cronbach's α for the three-item version was .83 at T1 and .85 at T2, and test-retest reliability from T1 to T2 was .68. For the full 5-item measure, Cronbach's α at T3 was .88.

Depression

Self Report (T1, T2, T3)

Depression was assessed using the 12-item Children's Depression Inventory 2 (CDI 2) Self-Report Short Version, with a response scale ranging from *1 = low level*

of symptom to 3 = *high level of symptom* (Kovacs, 2011; Appendix F). This scale is an updated version of the original CDI (Kovacs, 1985), including better normative sampling as well as an additional two items. The short version correlates strongly with the full version (Kovacs, 1992), which has been shown to have strong psychometric properties (e.g., Carey, Faulstich, Gresham, Ruggiero, & Enyart, 1987). In a sample of youth aged 7 to 16 years, internal consistency was .94 for non-depressed participants and .80 for participants with a psychiatric diagnosis (Saylor, Finch, Spirito, & Bennett, 1984). In a community sample of 7th-9th graders, the CDI demonstrated Cronbach's α of .83 for boys and .85 for girls (Smucker, Craighead, Craighead, & Green, 1986). In the current study, Cronbach's α was .81 at T1, .82 at T2, and .83 at T3. Test-retest reliability from T1 to T2 was .64.

Anxiety

Self Report (T1, T2, T3)

At T1 and T2, anxiety was assessed with the 10-item Multidimensional Anxiety Scale for Children-10, which uses a response scale ranging from 0 = *never true about me* to 4 = *often true about me* (MASC-10; March, 1997; Appendix G). This brief version of the original 39-item MASC correlates well with the full measure (March, Parker, Sullivan, Stallings, & Conner, 1997). The short version has also demonstrated both adequate test-retest reliability (March, Sullivan, & Parker, 1999) and strong validity in diverse samples (e.g., Kingery, Ginsburg, & Burstein, 2009). In

the current study, Cronbach's α was .77 at T1 and T2, and test-retest reliability from T1 to T2 was .60. At T3, we used the full 39-item MASC (March, 1997; Appendix H). The full version has demonstrated strong internal consistency in adolescents aged 12 – 15 (Cronbach's α = .88 for girls and = .89 for boys), with a test-retest reliability of .93 (March, 1997). In the current study, the full version demonstrated strong internal consistency with a Cronbach's α of .91.

Withdrawal

Self Report (T3)

Withdrawal was assessed using a 20-item version of the revised Child Social Preference Scale, which uses a response format ranging from *1 = not at all* to *5 = a whole lot* (Nelson, 2013; Appendix I). The original scale was developed as a parent-report measure for early childhood (Coplan, Prakash, O'Neil, & Armer, 2004), and the revised version was adapted for self report and first validated in a sample of Indian adolescents in the eighth grade. In that study, items loaded onto four factors with Cronbach's alphas ranging from .65 to .84 (Bowker & Raja, 2011). In an undergraduate American sample, internal consistency was higher, with Cronbach's alphas for the four factors ranging from .62 to .91 (Nelson, 2013). The current sample demonstrated a strong Cronbach's α across all items of .86.

Teacher Report (T1, T2)

Withdrawal was measured with the 8-item Withdrawal subscale of the BASC-2 TRS (Reynolds & Kamphaus, 2004; Appendix J) with a response format ranging from *1 = never* to *4 = almost always*. Internal consistency for this scale in prior work was .85 in children aged 8-11, with a test-retest reliability of .84 (Reynolds & Kamphaus, 2004). In the current study, Cronbach's α was .78 at T1 and .79 at T2, and test-retest reliability from T1 to T2 was .61.

Somatization

Self Report (T3)

Somatization was assessed using the 7-item Somatization scale from the BASC-3 Self-Report of Personality, for which the response format ranges from *1 = never true about me* to *4 = almost always true about me* (BASC-3 SRP; Reynolds & Kamphaus, 2015; Appendix K). Internal consistency for this scale was .71 in adolescents aged 12-14, with a test-retest reliability of .82 (Reynolds & Kamphaus, 2015). In the current sample, internal consistency for this scale was .84.

Teacher Report (T1, T2)

Somatization was assessed using the 9-item Somatization subscale of the BASC-2 TRS (Reynolds & Kamphaus, 2004; Appendix L) with a response format ranging from *1 = never* to *4 = almost always*. Internal consistency for this scale in

prior work was .82 in children aged 8-11, with a test-retest reliability of .74 (Reynolds & Kamphaus, 2004). Cronbach's α for this study was .86 at T1 and .87 at T2, and test-retest reliability from T1 to T2 was $r = .50$.

School Avoidance

Self Report (T3)

School avoidance was measured with the 12-item Negative Reinforcement subscale of the School Refusal Assessment Scale - Child – Revised, (SRAS-C-R; Kearney, 2002; Appendix M) which uses a response scale of *1 = never* to *6 = always*. This subscale has demonstrated a Cronbach's α of .80-.82 (Kearney, 2006), and test-retest reliability between .56 and .78 (Kearney, 2002). The SRAS-C-R correlates moderately to strongly with the original version (Kearney, 2002), on which the Negative Reinforcement subscale demonstrates convergent validity with other measures of negative affectivity such as anxiety and depression (Higa, Daleidin, & Chorpita, 2002). In the current sample, internal consistency was .87.

Teacher Report (T1, T2)

School avoidance was assessed using the 6-item School Avoidance subscale of the Teacher Rating Scale of School Adjustment (Ladd, Kochenderfer, & Coleman, 1996; Appendix N) which uses a response format of *1 = does not apply* to *3 = certainly applies*. In prior studies, internal consistency for this scale ranged from .76 to .81

(Birch & Ladd, 1997; Ladd et al., 1996). In the current study, Cronbach's α was .78 at T1 and .82 at T2, and test-retest reliability from T1 to T2 was .49.

Disordered Eating Behaviors

Self Report (T3)

Disordered eating behaviors were measured using the 26-item Children's Eating Attitude Test (ChEAT), which uses a response scale ranging from *1 = never* to *6 = always* (Maloney, McGuire, & Daniels, 1988; Appendix O). This scale has strong psychometric properties, with a Cronbach's α of .87 in middle school students and significant correlations with self-reported weight management behaviors and body dissatisfaction (Maloney et al., 1988; Smolak & Levine, 1994). In the current sample, internal consistency was .86.

Physical Inactivity

Self Report (T3)

Physical inactivity over the past 7 days was measured with the Physical Activity Questionnaire for Adolescents (PAQ-A; Kowalski, Crocker, & Kowalski, 1997; Appendix P). The PAQ-A has been well-validated in samples from 8-16 years old, with Cronbach's α between .79 and .89 and test-rest reliabilities from .75 to .82 (Crocker, Bailey, Faulkner, Kowalski, & McGrath, 1997). Furthermore, the PAQ-A

has been compared to accelerometer data in a sample of 13 year olds, with correlations of $r = .47$ for total physical activity and $r = .49$ for vigorous physical activity (Janz, Lutuchy, Wenthe, & Levy, 2008). Although these correlations are moderate, a systematic review of physical activity questionnaires found that most self-report measures show discrepancies with objective measures of activity (Helmerhorst, Brage, Warren, Besson, & Ekelund, 2012) and suggests that the concurrent validity of this measure is equal to or greater than other measures. In the current sample, internal consistency for this measure was .76.

There are several steps to scoring the PAQ-A. First, for item 1, all responses were averaged using a scale on which *1 = no* and *5 = 7 times or more*. Items 2 through 7 were scored such that *1 = lowest activity* (e.g., don't do PE) and *5 = highest activity* (e.g., always engage in activity at PE). For item 8, all responses were averaged using a scale on which *1 = none* and *5 = very often*. Next, the scores for all 8 items were averaged such that higher scores indicate greater physical activity. Finally, scores were multiplied by -1 so that higher score indicate greater physical inactivity.

Pubertal Status

Parent Report (T3)

As children's pubertal timing is related to BMI (Stensland et al., 2015) as well as to their negative body cognitions (de Guzman & Nishina, 2014; Ge, Elder, Regnerus, & Cox, 2001), we asked parents to complete the Pubertal Development

Scale (PDS; Petersen, Crockett, Richards, & Boxer, 1988; Appendix Q) and used this variable as a covariate in analyses. The PDS was originally developed as a self-report measure for children in grades 6-8. The self-report form demonstrates internal consistencies ranging from .68 to .83 (Peterson et al., 1988) and strong correlations with physician ratings of puberty (.61-.67; Brooks-Gunn, Warren, Rosso, & Gargiulo, 1987). The PDS can be used as a parent-report measure as well; it is the most widely used method of assessing pubertal stage by both adolescents and parents that does not involve images (Dorn, Dahl, Woodward, & Biro, 2006). When used as a parent-report measure, internal consistencies range from .68 to .78 (Carskadon & Acebo, 1993). Cronbach's alpha in this study was .85.

We chose to administer the PDS as a parent-report measure only for two reasons. First, we wished to spare the adolescent possible embarrassment. Second, a review of pubertal assessment scales found that, in studies examining relations between self- or parent-report measures and physical exam, parent-report measures correlated with physical exams similarly to self-report measures (Dorn et al., 2006). For example, one recent study comparing parent- and self-report measures to a physical exam in children aged 7-14 found that 90% of girls correctly self-assessed when they were in puberty, compared to 86% of parents; for boys, 74% correctly self-assessed, compared to 68% of parents (Rasmussen et al., 2015).

Family Demographics

Parent Report (T3)

Parents completed a demographic form (Appendix R). This measure was completed at the end of the home visit to ensure that rapport is established before asking parents to respond to potentially sensitive questions.

Other Parent and Teacher Measures

In addition to the measures reported above, data were collected for both depression and anxiety from teachers at T1 and T2, as well as from parents at T3. In addition, at T3, data were collected from parents about school avoidance, somatization, withdrawal, and physical inactivity. To determine whether data from self-report and either parent- or teacher-report could be reduced to a latent variable, we tested whether a one-factor or two-factor model structural equation model (SEM) provided a better fit to the data. For each model, the two-factor confirmatory factor analysis evidenced better fit, as indicated by a lower chi square value, lower RMSEA, higher CFI, and lower SRMR. There is a strong body of prior research with children indicating that data on internalizing symptoms from multiple informants often evidence low to moderate cross-informant correlations between children, teachers, and parents (see Achenbach, McConaughy, & Howell, 1987 and De Los Reyes et al., 2015, for meta-analyses). In a meta-analysis of 341 studies, De Los Reyes and colleagues (2015) found that informant reports correspond at lower levels on

internalizing symptoms than externalizing symptoms, as they by nature are internal to the child and therefore more difficult for other reporters to observe. As the majority of our cross-informant variables reflect such internalizing symptoms, child self-report variables were therefore used in further analyses.

Chapter 3

RESULTS

Analytic Strategy

We took a three-step approach to data analysis. First, preliminary analyses examined descriptive statistics and zero-order correlations amongst variables. Second, we tested path models for Hypotheses 1 and 2 using Mplus Version 8 (Muthén & Muthén, 1998-2017), controlling for pubertal status. Finally, we used multiple groups modeling to test gender moderation of the path models. We assessed model fit in SEM using the chi-square statistic, the Standardized Root Mean Squared Residual (SRMR; Bentler, 1995), the Bentler Comparative Fit Index (CFI; Bentler, 1990), and the Root Mean Square Error of Approximation (RMSEA). Non-significant chi-square values, RMSEA values of .05 or less, SRMR values of .08 or less, and CFI values of .95 or higher were used to indicate good fit (Hu & Bentler, 1999). For the purposes of this study, we considered any model which met criteria for good fit for at least two of the four indices to be of adequate fit to interpret the data.

Preliminary Data Analyses

Descriptive Statistics

We examined descriptive statistics (mean, standard deviation, range) and the percentage of missing data for each variable (see Table 1). Of note, most variables were significantly skewed using a cutoff of $\pm .50$. Full information maximum-likelihood estimation with robust standard errors was therefore used in all further analyses to handle missing data and to allow for parameter estimates, standard errors, and chi-square statistics that were robust to non-normality.

Table 1 Descriptive Statistics

Variable	Min.	Max.	Mean	SD	Skew	% Missing
T1 BMI percentile	.00	99.30	57.55	30.71	-.27	0
T1 Weight-related victimization	1.00	3.17	1.12	.36	3.51	0
T1 Body dissatisfaction	-3.00	3.00	.42	.89	.06	2.0
T1 Overconcern with weight	1.00	5.00	1.65	.91	1.83	0
T1 Depression symptoms	1.00	2.33	1.27	.30	1.48	0
T1 Anxiety symptoms	1.00	3.70	2.11	.56	.33	0
T1 Somatization	1.00	3.22	1.04	.20	8.96	0
T1 Withdrawal	1.00	3.88	1.43	.44	1.60	0
T1 School avoidance	1.00	2.67	1.05	.19	6.07	0
T2 Weight-related victimization	1.00	5.00	1.15	.48	5.53	0.7
T2 Body dissatisfaction	-2.00	3.00	.36	.79	.01	2.0
T2 Overconcern with weight	1.00	5.00	1.77	.96	1.67	0.7
T2 Depression symptoms	1.00	2.42	1.29	.31	1.53	0
T2 Anxiety symptoms	1.00	4.00	2.17	.55	.21	0
T2 Somatization	1.00	2.00	1.05	.15	3.87	0
T2 Withdrawal	1.00	3.25	1.44	.44	.93	0
T2 School avoidance	1.00	2.33	1.05	.16	4.99	0
T3 BMI percentile	.30	99.40	65.78	27.94	-.66	0
T3 Weight-related victimization	1.00	4.17	1.14	.45	5.14	0
T3 Body dissatisfaction	-2.00	7.00	.49	1.07	1.34	0.7
T3 Overconcern with weight	1.00	5.00	1.91	.86	1.32	0
T3 Depression symptoms	1.00	2.83	1.28	.28	2.19	0
T3 Anxiety symptoms	1.31	3.13	2.03	.40	.72	0
T3 Somatization	1.00	3.86	1.34	.48	2.06	0
T3 Withdrawal	1.00	3.40	2.06	.52	.53	0
T3 School avoidance	1.00	5.33	1.69	.70	1.821	0
T3 Disordered eating	1.12	4.35	1.84	.51	1.713	0
T3 Physical inactivity	-4.40	-1.00	-2.61	.70	.219	0
T3 Pubertal status	1.00	4.00	2.81	.71	-.626	0

Correlations

Bivariate correlations amongst all final variables are shown in Table 2.

Descriptive statistics and bivariate correlations were conducted in SPSS 24 (IBM Corp, 2016). All remaining analyses were conducted in MPlus Version 8 (Muthén & Muthén, 1998-2017).

Table 2 Bivariate Correlations

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. T1 BMI Percentile														
2. T1 Weight-related victimization	.32**													
3. T1 Negative body perception	.46**	.34**												
4. T1 Overconcern with weight	.42**	.56**	.55**											
5. T1 Depression symptoms	.10	.19*	.27**	.40**										
6. T1 Anxiety symptoms	.12	.27*	.26**	.34**	.41**									
7. T1 Somatization	.06	.01	.16	.00	-.06	-.05								
8. T1 Social withdrawal	.07	.23**	.07	.02	.13	.15	.13							
9. T1 School avoidance	.10	.04	.14	.09	.04	-.07	.80**	.13						
10. T2 Weight-related victimization	.33**	.43**	.40**	.63*	.36**	.17*	.04	.19	.04					
11. T2 Negative body perception	.52**	.39**	.58**	.56**	.24**	.16	.04	.05	.04	.48**				
12. T2 Overconcern with weight	.44**	.39**	.59**	.66**	.23**	.20*	.02	.05	.02	.61**	.56**			
13. T2 Depression symptoms	.17*	.23**	.31**	.38**	.71**	.36**	-.05	.16*	-.05	.46**	.21*	.34**		
14. T2 Anxiety symptoms	.06	.14	.33**	.31**	.38**	.64**	-.01	.09	-.01	.30**	.19*	.35**	.46**	
15. T2 Somatization	.12*	.16*	.11	.23**	.13	-.01	.09	.15	.14	.37**	.15	.21**	.23**	.05
16. T2 Social withdrawal	.18*	.27**	.01	.19*	.25**	.00	.14	.60*	.01	.38**	.10	.12	.27**	.08
17. T2 School avoidance	.15	.12	.13	.11	.21**	.13	.01	.21*	.09	.37**	.13	.22**	.31**	.12
18. T3 BMI Percentile	.70**	.32**	.42**	.43**	.16	.11	.03	.05	.03	.30**	.45**	.43**	.26**	.16
19. T3 Weight-related victimization	.29**	.43**	.30**	.37**	.02	-.01	.09	.04	.09	.41**	.30**	.46**	.12	.04
20. T3 Negative body perception	.41**	.12	.42**	.35**	.16*	.12	.09	.03	.09	.34**	.44**	.45**	.24**	.18*
21. T3 Overconcern with weight	.36**	.26**	.36**	.44**	.19*	.25*	.08	.02	.08	.42**	.28**	.56**	.32**	.32**
22. T3 Depression symptoms	.08	.06	.19*	.19*	.36**	.27**	-.04	.03	-.04	.22**	.11	.32**	.39**	.38**
23. T3 Anxiety symptoms	.11	-.04	.24**	.25**	.33**	.31**	.05	.04	.05	.21*	.14	.25**	.36**	.43**
24. T3 Somatization	.05	.03	.11	.19*	.30**	.23**	.03	-.01	.03	.18*	.06	.24**	.36**	.27**
25. T3 Social withdrawal	.10	.05	.06	.07	.11	.18*	.03	.29*	.03	.19*	.10	.21**	.22**	.33**
26. T3 School avoidance	.05	.07	.12	.12	.24**	.18*	.04	.10	.04	.14	.02	.23**	.27**	.29**
27. T3 Physical inactivity	.13	.13	.10	.19*	.09	.19*	-.04	.32**	-.04	.21*	.09	.17*	.10	.22**
28. T3 Disordered eating	.30**	.25**	.42**	.40**	.23**	.19*	.13	.02	.13	.38**	.29**	.50**	.28**	.32**
29. T3 Pubertal status	.13	.10	.29**	.20*	.05	-.05	-.01	-.13	-.01	.10	.11	.22**	.08	.07

Variable	15	16	17	18	19	20	21	22	23	24	25	26	27	28
15. T2 Somatization														
16. T2 Social withdrawal	.18*													
17. T2 School avoidance	.72**	.24**												
18. T3 BMI Percentile	.15	.15	.20*											
19. T3 Weight-related victimization	.53**	.15	.39**	.31**										
20. T3 Negative body perception	.17*	.11	.26**	.51**	.45**									
21. T3 Overconcern with weight	.31**	.10	.29**	.47**	.51**	.59**								
22. T3 Depression symptoms	.11	.05	.16	.17*	.33**	.47**	.58**							
23. T3 Anxiety symptoms	.13	.02	.09	.12	.15	.36**	.48**	.58**						
24. T3 Somatization	.14	-.03	.15	.13	.15	.32**	.42**	.61**	.51**					
25. T3 Social withdrawal	.27**	.20*	.21**	.17*	.31**	.24**	.38**	.50**	.62**	.32**				
26. T3 School avoidance	.09	.04	.13	.10	.27**	.26**	.42**	.66*	.62**	.45**	.53**			
27. T3 Physical inactivity	.19*	.29**	.20*	.09	.15	.17*	.11	.28**	.21**	.09	.39**	.20*		
28. T3 Disordered eating	.26**	.05	.31**	.34**	.47**	.56**	.68**	.57**	.52**	.47**	.32**	.49**	.09	
29. T3 Pubertal status	.11	-.17*	.07	.33**	.16	.15	.28**	.21**	.05	.10	.07	.12	.06	.16*

Note. * $p < .05$. ** $p < .01$.

KiVa Dosage

Of note, data for T1 and T2 were collected as a part of an evaluation of the KiVa Bullying Prevention Program over the course of that academic year, with all classrooms receiving the program and dosage effects assessed. To evaluate whether KiVa dosage might have an effect on these models, we ran bivariate correlations between KiVa dosage and all T2 variables, which would have been collected in the spring of 4th and 5th grade year subsequent to the KiVa Program. No significant correlations emerged between variables of interest at T2 and KiVa dosage for the current sample of 150, even though significant dosage effects did emerge for the larger project (Swift et al., 2017). Therefore, KiVa dosage was not controlled for in subsequent analyses.

Hypothesis Testing

For all models, we first tested whether each model was of good fit to the data. Then, if models were of good fit, we examined the models to determine whether hypotheses were supported by significant paths of interest (for bidirectional models, the cross-lag correlations between T1 and T3; for mediation models, the indirect effect of the mediation paths linking X to M from T1 to T2, and M to Y from T2 to T3). Due to the extensive amount of data generated by all these models, we chose to only report coefficients for models with good fit for which we found significance on paths of relevance to the hypotheses.

Goal 1

The two primary aims of this study were examined by running path models using Mplus Version 8 (Muthén & Muthén, 1998-2017). Our first goal was to test the reciprocal relations between variables for which data were collected at both T1 and T3, and for which bidirectional relations had not already been well-established in the literature. Variables included BMI percentile score, weight-related victimization, two negative body cognitions (body dissatisfaction and overconcern with weight) and five internalizing symptoms (depression, anxiety, withdrawal, somatization, and school avoidance). Five models were run examining the bidirectional relation between BMI percentile and 1) weight related-victimization, and 2) internalizing symptoms other than depression (anxiety, school avoidance, somatization, withdrawal). Models between BMI and depression and BMI and negative body cognitions were not run, as bidirectional relations are already well-established. Seven further models were run examining the bidirectional relations between weight-related victimization paired with the two negative body cognitions and five internalizing symptoms. Finally, ten models were run examining the bidirectional relations when pairing each of the two negative body cognitions with each of the five internalizing symptoms. Our hypothesis was that bidirectional relations would emerge across all models. Model fit statistics for all bidirectional models are presented in Table 3.

Table 3 Bidirectional Model Fit Statistics between Time 1 and Time 3

Models with BMI	χ^2	RMSEA	CFI	SRMR
Weight-related Victimization	2.867	0.054	0.992	0.046
Anxiety	2.833	0.053	0.993	0.039
School Avoidance	2.864	0.054	0.992	0.038
Somatization	2.757	0.05	0.995	0.037
Girls	7.094*	0.173	0.946	0.066
Boys	1.141	0.00	1.00	0.027
Withdrawal	5.36	0.106	0.97	0.048
Models with Weight-Related Victimization	χ^2	RMSEA	CFI	SRMR
Body Dissatisfaction	15.354***	0.211	0.698	0.076
Overconcern with Weight	6.849*	0.127	0.914	0.056
Anxiety	2.477	0.04	0.989	0.029
Depression	2.03	0.01	0.999	0.028
School Avoidance	1.99	0.00	1.00	0.025
Somatization	1.882	0.00	1.00	0.024
Withdrawal	5.328	0.105	0.917	0.039
Models with Body Dissatisfaction	χ^2	RMSEA	CFI	SRMR
Anxiety	17.042***	0.2234	0.725	0.07
Depression	18.198***	0.232	0.763	0.072
Girls	5.34	0.14	0.948	0.053
Boys	2.989	0.087	0.94	0.048
School Avoidance	18.577***	0.235	0.338	0.07
Girls	7.505*	0.18	0.76	0.058
Boys	2.28	0.046	0.00	0.038
Somatization	17.924***	0.23	0.69	0.07
Girls	8.241*	0.192	0.842	0.059
Boys	4.527	0.139	0.789	0.037
Withdrawal	20.65***	0.249	0.52	0.076
Models with Overconcern with Weight	χ^2	RMSEA	CFI	SRMR
Anxiety	7.603*	0.13	0.931	0.049
Girls	8.806*	0.2	0.821	0.053
Boys	3.61	0.111	0.952	0.051
Depression	7.473*	0.135	0.948	0.051
Girls	9.464**	0.21	0.864	0.055
Boys	1.863	0.00	1.00	31
School Avoidance	9.021*	0.153	0.901	0.049
Girls	9.672**	0.212	0.774	0.06
Boys	0.146	0.00	1.00	0.01
Somatization	7.912*	0.14	0.893	0.049

Girls	9.732**	0.213	0.652	0.061
Boys	0.202	0.00	1.00	0.008
Withdrawal	9.987**	0.163	0.901	0.057

Note: For models for which significant gender moderation emerged, the fit of each single-gender model is presented.

* $p < .05$; ** $p < .01$; *** $p < .001$

In total, 10 models evidenced good model fit across genders. These included five models linking BMI to weight-related victimization and four internalizing symptoms, as well as five models linking weight-related victimization to the five internalizing symptoms. No models linking negative body cognitions to internalizing symptoms evidenced good model fit when both genders were combined.

However, significant gender moderation emerged for one of these 10 models, the model linking BMI to somatization. This model was therefore interpreted separately for each gender in the following section on gender moderation. The remaining nine models, which did not evidence gender moderation, are interpreted below.

First, the bidirectional relations between BMI and weight-related victimization were examined (see Table 4). Significant or marginally significant cross-sectional correlations, auto-regressive paths, and cross-lag paths were found. Across genders, weight-related victimization at T1 positively predicted BMI at T3 ($\beta = .093, p = .02$). In addition, BMI at T1 positively predicted WRV at T3 ($\beta = .156, p = .01$).

Second, the bidirectional relations between BMI and three internalizing symptoms (anxiety, school avoidance, and withdrawal) were examined. For all three models, significance emerged only on autoregressive paths and cross-sectional correlations, but not on cross-lag paths.

Third, the bidirectional relations between weight-related victimization and all five internalizing symptoms were examined. For four of these five models, significance again emerged only on autoregressive paths and cross-sectional

correlations, rather than cross-lag paths. However, marginally significant negative cross-lag paths were found from weight-related victimization at T1 to anxiety at T3 ($\beta = -0.14, p = .088$) and from anxiety at T1 to weight-related victimization at T3 ($\beta = -0.13, p = .092$; see Table 4).

Table 4 Bidirectional Model Coefficients

BMI and Weight-Related Victimization (WRV): Both Genders				
Path	Beta	S.E.	Est/S.E.	p-value
<i>Cross-Sectional</i>				
T1 BMI with T1 WRV	.322	.076	4.225	<.001
T3 BMI with T3 WRV	.079	.041	1.930	.054
<i>Autoregressive</i>				
T3 BMI on T1 BMI	.655	.049	13.300	<.001
T3 WRV on T1 WRV	.473	.155	2.412	.016
<i>Cross-Lag</i>				
T3 BMI on T1 WRV	.093	.040	2.347	.019
T3 WRV on T1 BMI	.156	.061	2.548	.011
<i>Covariate</i>				
T3 BMI on T3 Pubertal Status	.240	.062	3.887	<.001
T3 WRV on T3 Pubertal Status	.102	.064	1.598	.110
Weight-Related Victimization (WRV) and Anxiety: Both Genders				
Path	Beta	S.E.	Est/S.E.	p-value
<i>Cross-Sectional</i>				
T1 WRV with T1 Anxiety	.271	.095	2.862	.004
T3 WRV with T3 Anxiety	.242	.080	3.036	.002
<i>Autoregressive</i>				
T3 WRV on T1 WRV	.460	.152	3.020	.003
T3 Anxiety on T1 Anxiety	.354	.079	4.484	<.001
<i>Cross-Lag</i>				
T3 WRV on T1 Anxiety	-0.134	.080	-1.682	.092
T3 Anxiety on T1 WRV	-0.140	.082	-1.706	.088
<i>Covariate</i>				
T3 WRV on T3 Pubertal Status	.107	.069	1.544	.123
T3 Anxiety on T3 Pubertal Status	.083	.069	1.215	.224
Overconcern with Weight (OCW) and Anxiety: Boys				
Path	Beta	S.E.	Est/S.E.	p-value
<i>Cross-Sectional</i>				
T1 OCW with T1 Anxiety	.193	.160	1.209	.226
T3 OCW with T3 Anxiety	.275	.087	3.159	.002
<i>Autoregressive</i>				
T3 OCW on T1 OCW	.556	.085	6.555	<.001
T3 Anxiety on T1 Anxiety	.240	.121	1.992	.046
<i>Cross-Lag</i>				
T3 OCW on T1 Anxiety	.024	.103	.229	.819
T3 Anxiety on T1 OCW	.284	.109	2.598	.009
<i>Covariate</i>				

T3 OCW on T3 Pubertal Status	-0.004	.085	-0.048	.961
T3 Anxiety on T3 Pubertal Status	-0.052	.104	-0.499	.618
Overconcern with Weight and Somatization: Boys				
Path	Beta	S.E.	Est/S.E.	p-value
<i>Cross-Sectional</i>				
T1 OCW with T1 Somatization	-0.088	.036	-2.445	.015
T3 OCW with T3 Somatization	.227	.145	1.562	.118
<i>Autoregressive</i>				
T3 OCW on T1 OCW	.572	.082	6.966	<.001
T3 Somatization on T1 Somatization	.285	.125	2.275	.023
<i>Cross-Lag</i>				
T3 OCW on T1 Somatization	.124	.071	1.739	.082
T3 Somatization on T1 OCW	.215	.099	2.173	.030
<i>Covariate</i>				
T3 OCW on T3 Pubertal Status	-0.010	.087	-0.119	.905
T3 Somatization on T3 Pubertal Status	-0.060	.092	-0.652	.514

Goal 1 Moderation by Gender

Multiple groups modeling was used to test gender moderation of the path models. These models were each run twice, first, without constraining any paths, and second, with the path coefficients constrained to be equal for boys and girls. The change in the chi-square statistic between the two models was examined using the Satorra-Bentler process for chi-square comparison to determine whether there was a statistically significant deterioration in model fit after constraints were imposed (Satorra & Bentler, 2001, 2010). In cases in which there was evidence of gender moderation, and at least one gender model exhibited good model fit, we also examined specific paths to determine which revealed gender differences.

Significant gender moderation was found for eight of the bidirectional models (see Table 5). Gender moderation was demonstrated for the model linking BMI to somatization. Gender moderation was also found for seven models linking negative body cognitions to internalizing symptoms; specifically, there was significant moderation for the models linking each of the two negative body cognitions to the internalizing symptoms of depression, school avoidance, and somatization, as well as for the model linking overconcern with weight to anxiety. No significant gender moderation was found for models including weight-related victimization. For each significant moderation effect, good fit was evidenced for at least one gender model. However, good model fit was sometimes driven solely by significant cross-sectional correlations and auto-regressive paths, with a number of models evidencing no significant cross-lag paths.

Table 5 Gender Moderation for Bidirectional Models

Models with BMI	Satorra-Bentler χ^2	DF	p-value
Weight-related Victimization	6.390	8	0.604
Anxiety	10.582	8	0.227
School Avoidance	12.982	8	0.112
Somatization	30.394	8	<.001
Withdrawal	12.548	8	0.128
Models with Weight-Related Victimization	Satorra-Bentler χ^2	DF	p-value
Body Dissatisfaction	13.069	8	0.109
Overconcern with Weight	5.197	8	0.736
Anxiety	7.167	8	0.519
Depression	7.716	8	0.462
School Avoidance	10.293	8	0.245
Somatization	7.118	8	0.524
Withdrawal	1.145	8	0.997
Models with Body Dissatisfaction	Satorra-Bentler χ^2	DF	p-value
Anxiety	10.354	8	0.241
Depression	23.342	8	0.003
School Avoidance	26.398	8	0.001
Somatization	42.603	8	<.001
Withdrawal	8.86	8	0.354
Models with Overconcern with Weight	Satorra-Bentler χ^2	DF	p-value
Anxiety	15.769	8	0.046
Depression	30.006	8	<.001
School Avoidance	20.754	8	0.008
Somatization	16.853	8	0.032
Withdrawal	7.16	8	0.519

BMI and Somatization

For BMI and somatization, good model fit was evidenced for boys, but not for girls. However, no significant cross-lag paths emerged in this model.

Body Dissatisfaction and Internalizing Symptoms

For body dissatisfaction and internalizing symptoms, good model fit was found for boys for the models including depression, school avoidance, and somatization. Good model fit was not found for girls for any model. Again, no significant cross-lag paths emerged in these three models.

Overconcern with Weight and Internalizing Symptoms

For overconcern with weight and internalizing symptoms, good model fit emerged for boys for the models including anxiety, depression, school avoidance, and somatization. Across these four models, three significant or marginally significant cross-lag paths were found (see Table 4), with T1 overconcern with weight predicting T3 anxiety ($\beta = .284, p = .009$), T1 overconcern with weight predicting T3 somatization ($\beta = .215, p = .03$), and T1 somatization predicting T3 overconcern with weight ($\beta = .124, p = .082$).

Goal 2

Structural equation modeling was also used to examine mediation models between variables. Thirty-two models were run in total. Specifically, the following

models were run: a) two iterations of the model linking BMI, weight-related victimization, and negative body cognitions (Figure 6; one for each of the two negative body cognitions), b) ten iterations of the model linking weight-related victimization, negative body cognitions, and internalizing symptoms (Figure 7; one for each combination of the two negative body cognitions and the five internalizing symptoms), and c) 20 iterations of the model linking negative body cognitions, internalizing symptoms, and negative health behaviors (Figure 8; one for each combination of the two negative body cognitions, the five internalizing symptoms, and the two negative health behaviors). Fit statistics are presented in Table 6. When mediation models were run for the total sample without consideration of gender moderation, no mediation models evidenced good fit to the data. Therefore, none of these models were interpreted further.

Table 6 Mediation Model Fit Statistics

BMI → Weight-related Victimization → Negative Body Cognitions	χ^2	RMSEA	CFI	SRMR
Body Dissatisfaction	69.633***	0.199	0.471	0.1
Overconcern with Weight	91.188***	0.233	0.543	0.11
Girls	84.671***	0.296	0.457	0.114
Boys	33.85***	0.192	0.719	0.086
Weight-related Victimization → Body Dissatisfaction → Internalizing Symptoms	χ^2	RMSEA	CFI	SRMR
Anxiety	26.983**	0.106	0.894	0.066
Depression	19.092*	0.078	0.941	0.063
School Avoidance	32.275***	0.122	0.51	0.063
Girls	36.33***	0.177	0.239	0.067
Boys	7.91	0	1	0.061
Somatization	32.021***	0.121	0.652	0.073
Withdrawal	25.907**	0.103	.865	.071
Weight-related Victimization → Overconcern with Weight → Internalizing Symptoms	χ^2	RMSEA	CFI	SRMR
Anxiety	23.701**	0.096	0.922	0.066
Depression	19.651*	0.08	0.948	0.062
Girls	24.475**	0.13	0.878	0.074
Boys	7.55	0	1	0.039
School Avoidance	17.073	0.069	0.89	0.057
Girls	19.15*	0.104	0.82	0.07
Boys	5.222	0	1	0.032
Somatization	18.789*	0.076	0.882	0.064
Withdrawal	29.82***	0.115	0.866	0.073
Body Dissatisfaction → Internalizing Symptoms → Physical Inactivity	χ^2	RMSEA	CFI	SRMR
Anxiety	26.125**	0.096	0.916	0.068
Depression	22.513*	0.084	0.945	0.075
School Avoidance	24.683*	0.091	0.809	0.072
Girls	17.425	0.083	0.889	0.075
Boys	12.338	0.043	0.986	0.065
Somatization	27.564**	0.1	0.846	0.076
Withdrawal	37.771***	0.123	0.855	0.086
Body Dissatisfaction → Internalizing Symptoms → Disordered Eating	χ^2	RMSEA	CFI	SRMR
Anxiety	42.471***	0.138	0.859	0.098
Girls	30.594**	0.145	0.878	0.106

Boys	16.051	0.084	0.928	0.087
Depression	42.093***	0.137	0.877	0.104
School Avoidance	55.363***	0.164	0.502	0.109
Girls	50.728***	0.206	0.546	0.117
Boys	17.58	0.096	0.935	0.088
Somatization	64.307***	0.18	0.618	0.114
Withdrawal	39.067***	0.166	0.764	0.121
Overconcern with Weight → Internalizing Symptoms → Physical Inactivity	χ^2	RMSEA	CFI	SRMR
Anxiety	37.888***	0.128	0.873	0.094
Depression	35.147***	0.121	0.901	0.098
School Avoidance	40.14***	0.133	0.69	0.096
Somatization	54.724***	0.163	0.69	0.103
Withdrawal	47.214***	0.148	0.807	0.112
Overconcern with Weight → Internalizing Symptoms → Disordered Eating	χ^2	RMSEA	CFI	SRMR
Anxiety	25.263**	0.093	0.924	0.064
Girls	22.599*	0.111	0.92	0.094
Boys	24.387*	0.137	0.832	0.105
Depression	24.218*	0.09	0.942	0.073
Girls	21.554*	0.106	0.992	0.106
Boys	26.928**	0.149	0.857	0.1
School Avoidance	23.529*	0.087	0.853	0.064
Girls	37.680**	0.169	0.701	0.101
Boys	31.653**	0.170	0.823	0.111
Somatization	28.943**	0.104	0.858	0.069
Withdrawal	36.055***	0.123	0.864	0.078

Note: For models for which significant gender effects emerged, the fit of each single-gender model is presented.

* $p < .05$; ** $p < .01$; *** $p < .001$

Goal 2 Moderation by Gender

Evidence of significant moderation was found for ten of the 32 mediation models (see Table 7). However, for four of these ten models, neither the model for girls nor the model for boys evidenced good fit by any fit indices. Two of the ten models only evidenced good fit for boys by one fit index (chi square), and therefore were not interpreted further. Of the remaining four models, three were variations of Figure 7 linking weight-related victimization, negative body cognitions, and internalizing symptoms. These three models all evidenced good fit for boys but not for girls. The other model was a variation of Figure 8 linking body dissatisfaction, school avoidance, and physical inactivity. This model evidenced good fit for both genders. However, no indirect effects emerged for any of these good-fitting models for either boys or girls, suggesting that hypothesized mediation effects were not present.

Table 7 Gender Moderation for Mediation Models

BMI → Weight-related Victimization → Negative Body Cognitions	Satorra-Bentler χ^2	DF	p-value
Body Dissatisfaction	27.901	11	0.003
Overconcern with Weight	17.781	11	0.087
Weight-related Victimization → Body Dissatisfaction → Internalizing Symptoms	Satorra-Bentler χ^2	DF	p-value
Anxiety	18.95	11	0.062
Depression	15.435	11	0.163
School Avoidance	27.105	11	0.004
Somatization	17.134	11	0.104
Withdrawal	10.105	11	0.521
Weight-related Victimization → Overconcern with Weight → Internalizing Symptoms	Satorra-Bentler χ^2	DF	p-value
Anxiety	17.457	11	0.095
Depression	23.689	11	0.014
School Avoidance	21.669	11	0.027
Somatization	14.25	11	0.219
Withdrawal	14.79	11	0.192
Body Dissatisfaction → Internalizing Symptoms → Physical Inactivity	Satorra-Bentler χ^2	DF	p-value
Anxiety	11.908	10	0.291
Depression	10.757	10	0.377
School Avoidance	28.794	10	0.001
Somatization	13.765	10	0.184
Withdrawal	10.6	10	0.39
Body Dissatisfaction → Internalizing Symptoms → Disordered Eating	Satorra-Bentler χ^2	DF	p-value
Anxiety	23.966	10	0.008
Depression	16.11	10	0.097
School Avoidance	50.866	10	0
Somatization	17.92	10	0.056
Withdrawal	13.243	10	0.21
Overconcern with Weight → Internalizing Symptoms → Physical Inactivity	Satorra-Bentler χ^2	DF	p-value
Anxiety	12.908	10	0.229
Depression	13.913	10	0.177
School Avoidance	14.007	10	0.173
Somatization	10.129	10	0.429
Withdrawal	9.526	10	0.483

Overconcern with Weight → Internalizing Symptoms → Disordered Eating	Satorra-Bentler χ^2	DF	p-value
Anxiety	24.46	10	0.006
Depression	19.078	10	0.039
School Avoidance	26.082	10	0.004
Somatization	13.627	10	0.191
Withdrawal	12.338	10	0.263

Auxiliary Analyses

Given the significant bidirectional findings between BMI and weight-related victimization, as well as the lack of significant findings in mediation analyses testing our larger conceptual model, we considered the possibility that weight-related victimization may directly mediate the relation between BMI and the two negative health behaviors, without the need for serial mediation through a longer chain of events also including negative body cognitions and internalizing symptoms. As such, we ran two additional sets of analyses examining these two mediation models. Gender moderation effects did not emerge for either model.

Physical Inactivity

The mediation model linking BMI, weight-related victimization, and physical inactivity evidenced good fit across three indicators [$\chi^2_{(4, n = 150)} = 7.457, p = n.s.,$ RMSEA = .057_(90% CI = .00-0.14), CFI = .978, SRMR = .03]. Both mediation paths were significant, with T1 BMI predicting T2 weight-related victimization when controlling for T1 weight-related victimization ($\beta = .197, p < .001$), as well as T2 weight-related victimization predicting T3 physical inactivity ($\beta = .206, p = .02$). The indirect effect was also significant ($\beta = 0.041, p = .04$), suggesting that weight-related victimization does have a mediating effect on the relation between BMI percentile and physical inactivity (see Figure 9).

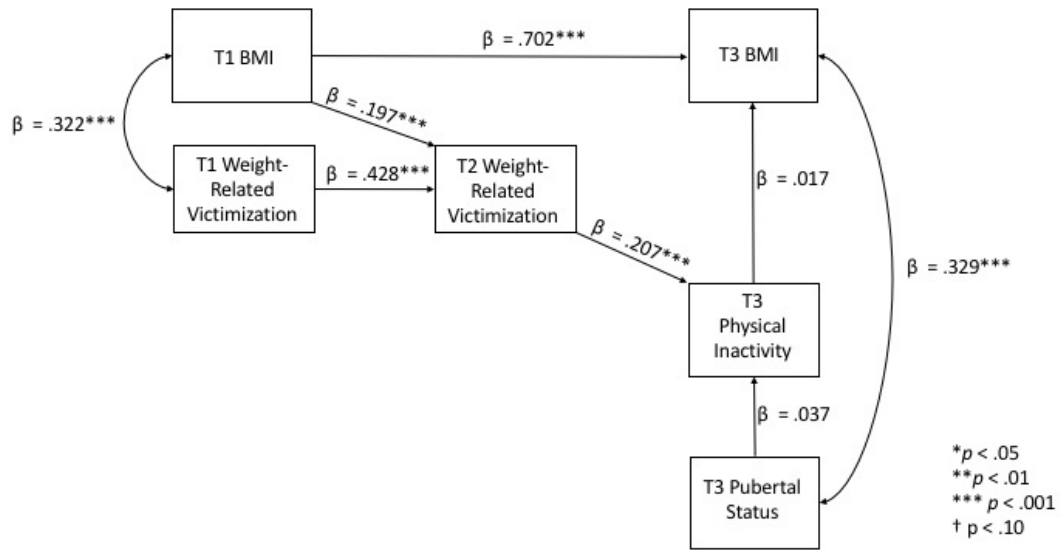


Figure 9 Mediation model linking T1 BMI, T2 weight-related victimization, T3 physical inactivity, and T3 BMI

Disordered Eating

For the mediation model linking BMI, weight-related victimization, and disordered eating, one of four indicators showed good model fit, with CFI just under .95 [$\chi^2_{(4, n=150)} = 11.873, p < .05$, RMSEA = .096(90% CI = .022-.0167), CFI = .942, SRMR = .04]. Both mediation paths were again significant, with T1 BMI predicting T2 weight-related victimization when controlling for T1 weight-related victimization ($\beta = .197, p < .001$), and T2 weight-related victimization predicting T3 disordered eating ($\beta = .376, p = .001$). The indirect effect in this model was also significant ($\beta = .074, p < .01$). In this model, T3 BMI percentile was also significantly predicted by T3 disordered eating behaviors, even while controlling for T1 BMI ($\beta = .116, p = .015$; see Figure 10).

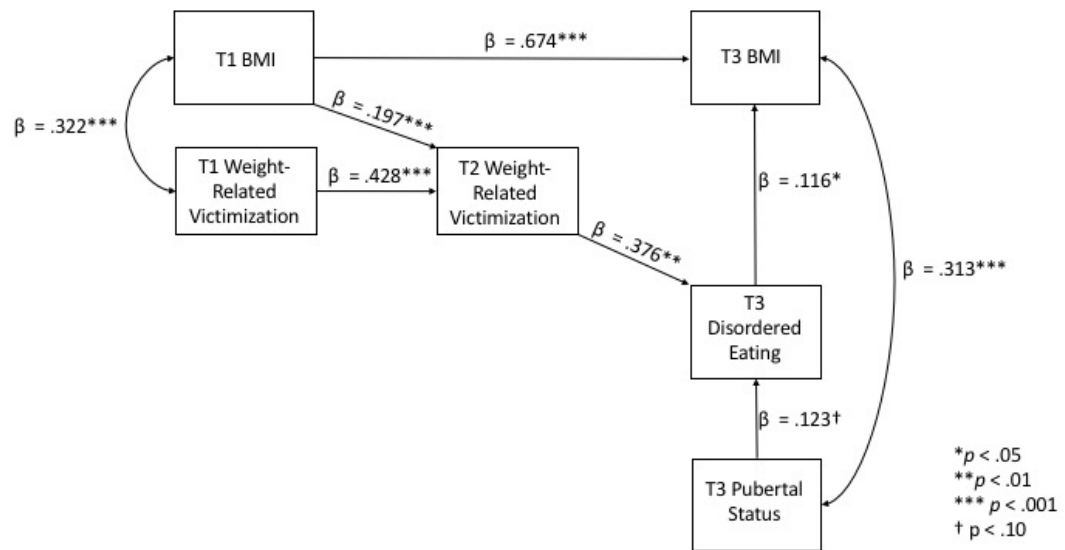


Figure 10 Mediation model linking T1 BMI, T2 weight-related victimization, T3 disordered eating, and T3 BMI

Chapter 4

DISCUSSION

In the current study, we examined the longitudinal relations among BMI, weight-related victimization, negative body cognitions, internalizing symptoms, and negative health behaviors. We investigated these relations both as bidirectional models between pairs of these constructs, and as mediation models among sets of three of these constructs, and we explored whether these effects were moderated by gender. Our overarching aim was to provide support for the hypothesis that youth with higher BMI are more likely to experience weight-related victimization and that this victimization sets off a chain of events including increased negative body cognitions, increased internalizing symptoms, and increased negative health behaviors which ultimately feeds back to adversely impact youth's BMI. A major strength of the study was the longitudinal design, which allowed us to examine these relations over the transition from childhood to adolescence.

BMI and Weight-Related Victimization

A major goal of our study was to better understand the relation between weight-related victimization and BMI. Our analyses demonstrated that there is a significant reciprocal relation between BMI and weight-related victimization over time. Children with a higher BMI percentile in 4th and 5th grade were more likely to be

teased about their weight in 7th and 8th grade, even when controlling for prior levels of weight-related victimization and concurrent BMI. At the same time, children who are teased about their weight in 4th and 5th grade evidence increased BMI in 7th and 8th grade, controlling for earlier BMI and concurrent weight-related teasing. These findings suggest that children who experience weight-related victimization are at risk of increased BMI over time, likely compounding the problem of victimization that they experience.

Prior studies have also indicated that even when other risk factors are controlled, both general and weight-related victimization prospectively predict increased BMI across development (middle childhood to age 18, Baldwin et al., 2016; early adolescence to late adolescence, Haines et al., 2007; adolescence to young adulthood, Quick et al., 2013; early childhood to middle age, Takizawa et al., 2015). Two additional studies of BMI and general victimization, one examining this relation in early childhood and the other from early adolescence to late adolescence, found that this relation held for girls only (Adams & Bukowski, 2008; Qualter et al., 2015). However, only one of these studies assessed effects bidirectionally, from ages 3 to 10 (Qualter et al., 2015). This study further supports these bidirectional effects, and is the first study to our knowledge that measures these effects across the transition from middle childhood to adolescence. In addition, our study controlled for the influence of pubertal status, suggesting that even at a time when children's bodies are changing significantly, and this phenomenon is accounted for, weight-related victimization in middle childhood predicts increased BMI in adolescence.

Weight-Related Victimization and Mediation Analyses

Our mediation analyses were designed to examine a hypothesized serial mediation model proposing that the link between earlier weight-related victimization and later increases in BMI occur through the development of negative body cognitions and internalizing symptoms which then affect negative health behaviors which directly contribute to weight gain. However, our analyses did not support this mediational process. Many of the mediation models did not evidence good fit to the data, either across-gender (for those without gender moderation) or in single-gender models. For those that did evidence good fit, indirect effects did not provide support for mediation.

There are several possible explanations for the null results including: a) the order of constructs in the model tested, b) the inclusion of constructs not critical to the model, c) the specific time points in development at which constructs were assessed, d) the inclusion of statistical controls for constructs at prior time points, and e) the importance of other mediating variables not assessed. Each of these possibilities will be discussed below.

Construct Order

We hypothesized a specific order in our serial mediation model, with increases in BMI, weight-related victimization, negative body cognitions, internalizing symptoms, and negative health behaviors cascading in that particular sequence. Given that the prior research on which this model was predicated was often cross-sectional, it is possible that our theorized ordering of constructs was incorrect, and that significant

findings would emerge if we tested a model with a different sequence of constructs. For example, Lee and Vaillancourt (2018b) recently found that earlier disordered eating predicted later depression. This is complicated by the possibility that some overarching constructs may be combined; a recent review article suggested that for disordered eating pathology, peer victimization increases “psychological dysfunction,” a variable conceptualized as capturing both negative body cognitions and psychopathological symptoms together, which then increased disordered eating symptoms (Lee & Vaillancourt, 2018a).

Inclusion of Unnecessary Constructs

Another possibility is that one or more of these constructs, or categories of constructs, are not needed in the model. For example, prior work within our own lab demonstrated that weight-related victimization is a mediator between BMI and both depression and withdrawal (Bookhout et al., 2018). Although negative body cognitions have been linked to both weight-related victimization and internalizing symptoms, perhaps these cognitions do not mediate their relation, but instead are a third variable associated with each. A similar study found that anxiety mediated the relation between general victimization and disordered eating symptoms, again without the necessity of including negative body cognitions (Cook-Cottone et al., 2016). It is also possible that internalizing symptoms do not have a place in the model; another study demonstrated that body image shame mediates the relation between victimization and disordered eating (Duarte, Pinto-Gouveia, & Stubbs, 2017).

Finally, the auxiliary analyses conducted here suggest that weight-related victimization at T2 mediates the relation between T1 BMI and T3 negative health behaviors, suggesting that neither negative body cognitions nor internalizing symptoms are critical to the model. While these findings are certainly limited by the lack of statistical control for negative health behaviors at earlier time points, they may suggest that the relation linking weight-related victimization and increased BMI does not require negative body cognitions or internalizing symptoms. A systematic review of qualitative studies on the reasons why overweight adolescents do not engage in physical activity suggested that, although body image played a role for certain activities such as swimming, victimization was the predominant reason given by overweight adolescents for avoiding physical activity, which is often particularly social for youth (e.g., gym class, team sports; Stankov, Olds, & Cargo, 2012).

Developmental Assessment of Constructs

Another possible explanation for the lack of significant mediation effects is the spacing and timing of assessment points (T1 in early 4th or 5th grade, T2 in late 4th or 5th grade, T3 three years later in 7th or 8th grade). Mediation effects may have been stronger had the outcome variable been measured closer in time to the predictor and mediator. Over the course of three years, other developmental factors or personal experiences may have intervened, diluting the effect.

Another possibility is that these relations that may be better captured at the micro level, for example, through daily diary analyses. This may also illuminate

relations in sub-clinical symptoms; for example, perhaps teasing experiences lead to temporary increases in negative emotionality, which could lead to increased eating behaviors or decreased physical activity, even if those daily fluctuations do not progress to the development of depressive symptoms that would result in more elevated scores on the CDI.

Effect of Statistical Controls

In all models, we controlled for the stability of the mediator from T1 to T2 and the stability of the outcome from T1 and T2 to T3, if such data were available. This rigorous analytic approach may have made it particularly difficult to uncover mediation effects for constructs demonstrating strong temporal stability. Instead, it is possible that overweight youth may develop negative body cognitions and internalizing symptoms in elementary school and maintain these symptoms without increasing them. If this is the case, to uncover increases in the constructs assessed here, future work may need to begin longitudinal assessment earlier in childhood. Few studies have examined weight-related victimization in early childhood, but those that have been conducted suggest that it is linked to negative outcomes as young as six or seven years of age (e.g., Datar & Sturm, 2006; Harrist et al., 2016). In addition, there is evidence that girls as young as five years old exhibit negative body cognitions, with identified predictors including media exposure (e.g., Damiano, Paxton, Wertheim, McLean, & Gregg, 2015), peer influence (e.g., Damiano et al., 2015), use of toys reflecting the thin ideal (e.g., Dittmar, Halliwell, & Ive, 2006), and

parental influence (e.g., Perez, Kroon Van Diest, Smith, & Sladek, 2016).

Other Potential Mediators

Finally, other factors beyond those assessed here may contribute to increases in youth BMI over time. For example, weight-related victimization may trigger physiological responses that can be linked to increased obesity. Both lower morning cortisol activity and higher stress-induced cortisol reactivity have been linked to increased BMI in adolescents (e.g., Ruttle et al., 2014). Although these responses have not been studied specifically for weight-related victimization, experiencing childhood adversity has been linked to a flattened cortisol awakening response in adolescence, which partially mediated an association between childhood adversity and young adult BMI (Miller, Arbel, Shapiro, Han, & Margolin, 2018). In fact, the Cyclic Obesity-Weight Based Stigma Model (Tomiya, 2014) posits that the experience of weight stigma leads to weight gain through increased cortisol secretion and increased eating behavior. Evidence in support of this model includes studies linking weight stigma to increased cortisol productivity both cross-sectionally (Tomiya et al., 2014) and experimentally (Schvey, Puhl, & Brownell, 2014) in adults, social stress experiences to increased cortisol production in obese adolescents (Verdejo-Garcia et al., 2014), and cortisol reactivity to increased snacking behavior (Newman, O'Connor, & Conner, 2007).

BMI and Internalizing Symptoms

When we examined the bidirectional relations between BMI and internalizing symptoms for constructs for which the literature was sparse (anxiety, somatization, withdrawal, and school avoidance), no significant cross-lag paths emerged. While it is certainly possible that these particular internalizing symptoms are not linked to BMI, other explanations for these null findings are also possible.

For both somatization and school avoidance, autoregressive paths in the models were weak, and even simple bivariate correlations from T1 to T3 were nonsignificant, suggesting little temporal stability in these constructs from middle childhood to early adolescence. This may, at least in part, be due to a change in raters from T1 (teacher) to T3 (self). It is notable that neither T1 somatization nor T1 school avoidance were associated with any other T1 variables except each other, and the mean scores for these variables were quite low. It may be that these internalizing symptoms are particularly difficult for teachers to assess early in the school year, and so they rate only the most vocal children as displaying them. When considering the other path, from earlier BMI to later somatization and school avoidance, the lack of significant bivariate correlations at T3 suggests that these are likely true null effects.

For anxiety, the issue may be that we assessed general anxiety rather than a subtype, such as social anxiety, which may be more closely linked to BMI. Previous findings on the relation between BMI and anxiety have been mixed (e.g., Roberts & Duong, 2016; Tanofsky-Kraff et al., 2004; Zeller, Saelens, Roehrig, Kirk, & Daniels, 2004), with more consistent findings emerging for social anxiety (e.g., Lanza, Echols,

& Graham, 2013; Rancourt et al., 2014; Thompson et al., 2013). In future auxiliary analyses, we plan to examine links between T1 BMI and T3 subtypes of anxiety, although these analyses will be limited by the lack of data on subtypes of anxiety at T1, since we only measured general anxiety at that time point.

The null results for the bidirectional model linking BMI and withdrawal may hinge on the need to include weight-related victimization in the model, given that earlier work in our lab found that the link was mediated by this type of victimization (Bookhout et al., 2018). To our knowledge, only one study has examined the link between BMI and withdrawal in youth, and that study was not bidirectional. Chronicity of obesity may also be important to understanding the relation between BMI and social withdrawal; Xie and colleagues (2013) found that chronically overweight or obese displayed higher rates of social withdrawal than children who became overweight or obese over time.

Weight-Related Victimization and Negative Body Cognitions/Internalizing Symptoms

Overall, few significant bidirectional effects emerged between weight-related victimization and either negative body cognitions or internalizing symptoms. For negative body cognitions, model fit was poor, and for internalizing symptoms, only one model evidenced marginally significant cross-lag paths.

However, for this model which linked weight-related victimization to anxiety, findings were in the opposite direction from hypotheses, with earlier weight-related

victimization predicting later decreased anxiety and earlier anxiety predicting later decreased weight-related victimization. Two prior studies of these constructs found that weight-related victimization is concurrently positively associated with anxiety and longitudinally positively associated with fear of negative evaluation, a form of social anxiety (Libbey et al., 2008; Rancourt et al., 2014). These findings mirror cross-sectional results in the current study, and the autoregressive paths were significant, suggesting temporal stability in both constructs. This information, along with the marginal significance of the negative relations, makes us hesitate to interpret them further.

For the models linking weight-related victimization to the internalizing symptoms of depression and withdrawal, strong cross-sectional and autoregressive paths emerged. As discussed above, these results suggest that levels of these constructs may have stabilized by the developmental periods assessed, and future researchers will need to study younger children to uncover the increases in constructs over time that we predicted. For the models including school avoidance or somatization, null findings may be due to the same issues discussed above regarding changes in raters over time, low mean levels, and weak temporal stability.

Negative Body Cognitions and Internalizing Symptoms

When examining bidirectional relations between negative body cognitions and internalizing symptoms, only three significant cross-lag paths emerged, and they were all for models including boys only. The strong temporal stability in negative body

cognitions likely made it difficult to uncover statistically significant relations with internalizing symptoms. In addition, none of the models for girls evidenced good fit, perhaps because the development of negative body cognitions is multiply determined, or linked to many different processes and experiences, especially for girls.

For boys, overconcern with weight in elementary school predicted increased anxiety in early adolescence. Three other investigations found concurrent links between body dissatisfaction and anxiety (Cromley et al., 2012; Newman et al., 2006; Vander Wal & Thomas, 2004), and our work extends the literature to suggest that this link holds for boys across the developmental span from middle childhood to adolescence. Although several studies have documented a reduction in anxiety from middle childhood to early adolescence (e.g., Hale, Raajmakers, Muris, van Hoof, & Meeus, 2008; Olatunji & Cole, 2009; Van Oort, Greaves-Lord, Verhulst, Ormel, & Huizink, 2009), a subgroup of youth with anxiety sensitivity may instead demonstrate an increase in anxiety over this time span (Allan et al., 2014). Although boys are slower to develop negative body cognitions than girls, and most have not done so by middle childhood (e.g., Shriver et al., 2013), anxiety sensitivity may predispose boys to develop these negative thoughts earlier than their peers; this reasoning may help to explain why the link between earlier overconcern with weight and later anxiety emerged for boys but not girls.

Boys also evidenced a bidirectional relation between overconcern with weight and somatization, with each construct predicting increases in the other from T1 to T3. This finding aligns with one other study demonstrating a link between somatization at

age 13 and body image at age 15 in a Native American sample of boys and girls (Newman et al., 2006). The link between earlier overconcern with weight and later somatization may represent a tendency for some boys to be particularly attuned to their bodies across these domains; boys may begin by focusing on worries about weight gain, and their worries may expand to include more general health concerns, perhaps even linked to obesity in some respects. The finding linking T1 somatization to T3 overconcern with weight should be interpreted with caution due to the previously-stated concerns with low mean levels of T1 somatization. Although the few boys who struggled with somatization at T1 may have evidenced increases in overconcern with weight over time, this effect could also be spurious and the result of outliers in the data.

Implications

The reciprocal relation between BMI and weight-related victimization highlights the importance of reducing this form of victimization in classroom settings, as such reductions may contribute to corresponding decreases in the BMI of overweight youth. Weight-related victimization is considered the last socially-acceptable form of discrimination (Puhl & Brownell, 2001), and yet current bullying prevention programs typically do not pay special attention to bullying about weight. As interventionists begin to tackle the tacit acceptance of weight-related victimization, they will need to focus on addressing this stigma without bringing undue attention to youth who struggle with obesity. One way to do so may be through efforts to increase

social support; a recent study of severely obese adolescents by Reiter-Purtill and colleagues (2017) demonstrated through moderation analyses that social support was key to breaking the link between peer victimization and internalizing symptoms. Bystander-based bullying prevention programs, which seek to change school climate to make bullying less socially acceptable, may be well-suited to these aims.

Similarly, programs targeting childhood obesity should consider the role of weight-related victimization on children's engagement in negative health behaviors. Interventionists could teach children skills to cope with and combat these experiences, as well as ways to seek social support when they occur. In addition, weight-management programs sometimes provide opportunities for overweight and obese children to engage in structured physical activity together, in an environment safe from peer harassment. These opportunities may be especially critical to successful weight loss for children who avoid physical activity for fear of being teased or shamed.

Limitations and Future Directions

The current study was marked by several limitations. First, T1 BMI was assessed via parent report of children's height and weight, which may have been inaccurate or outdated. Furthermore, these data were collected during a school-based parental consent process, resulting in a number of parents who failed to complete this information. The fact that children without T1 BMI data were excluded from the current study may have biased the sample, perhaps because the children of parents

who did not know their height and weight may differ in important ways from their peers, or because parents of particularly overweight children may have chosen not to disclose their child's weight to researchers. Overall, these concerns suggest that future researchers should strive to gather objective measurements of BMI at all time points.

Second, a number of children could not be located at T3 due to phone disconnections, families moving, or other structural barriers. Despite intense efforts to locate these families, our sample was skewed toward youth with more stable home situations (e.g., lived in the same home with the same phone number and parental email address from T1 to T3). Relatedly, a full 55% of our T3 sample reported incomes of \$100,000 or greater, raising concerns about generalizability to more disadvantaged groups.

Third, some obesity researchers criticize the use of BMI to assess weight, in that children may be classified as overweight or obese based on muscle mass rather than adiposity. However, Freedman and Sherry (2009) found that BMI percentile is a good indicator of body fatness for overweight and obese children, though it may be less accurate for normal-weight children. In fact, their findings indicate that BMI percentile has high specificity (95%), with children classified as overweight or obese very likely to have high levels of body fatness, but only moderately high sensitivity (70-80%), indicating that some children with high levels of body fatness may not have been identified. This decrease in sensitivity may have made it more difficult to uncover relations between BMI and other constructs in the current study.

Fourth, although the negative health behaviors of physical inactivity and

disordered eating were included at T3, they were not assessed at T1 or T2. Therefore, mediation models including these constructs could not control for their levels at prior time points, and bidirectional models including these constructs could not be investigated.

Finally, several of the variables in our sample exhibit significant skew. Although we used full information maximum-likelihood estimation with robust standard errors to account for this, infrequent behaviors may be better estimated by other methods for positively skewed event data, including Poisson models, negative binomial models, zero-inflated Poisson models, and zero-inflated negative binomial models (e.g., Atkins & Gallop, 2007).

Conclusions

The current study suggests that there is a bidirectional relation between BMI and weight-related victimization over time. Although hypothesized mediation models failed to elucidate the processes through which these constructs are linked, auxiliary analyses suggest that weight-related victimization may mediate the association between BMI and the negative health behaviors of physical inactivity and disordered eating. While additional future research is clearly needed, those designing intervention and prevention programs should consider including weight-related victimization as a specific target, both in programs focused on weight loss and in programs focused on bullying reduction. If such programs could prevent increases in BMI over time, they could play a critical role in helping to reduce the epidemic of childhood obesity that

currently plagues our youth.

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Appendix A

GENERAL WEIGHT TEASING SUBSCALE OF THE PERCEPTION OF TEASING SCALE

T1, T2, T3 Self-Report Measure of Weight-Related Victimization (Thompson, Cattarin, Fowler, & Fisher, 1995)

Here are some sentences about some different things that might have happened to you. For each sentence, circle how often these things have happened in the past year. If this has happened to you a whole lot, circle 5. If this thing has happened to you a lot, circle 4. If this has happened to you sometimes, circle 3. If this has happened to you a little, circle 2. If this has not happened to you at all, circle 1. Remember, all kids are different, so there are no right or wrong answers. Just answer how often these things have happened in the past year.

1. People made fun of you because you were heavy.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
2. People made jokes about you being too heavy.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
3. People laughed at you for trying out for sports because you were heavy.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
4. People called you names like fatso.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
5. People pointed at you because you were overweight.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot

6. People snickered about your heaviness when you walked into a room alone.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
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Appendix B

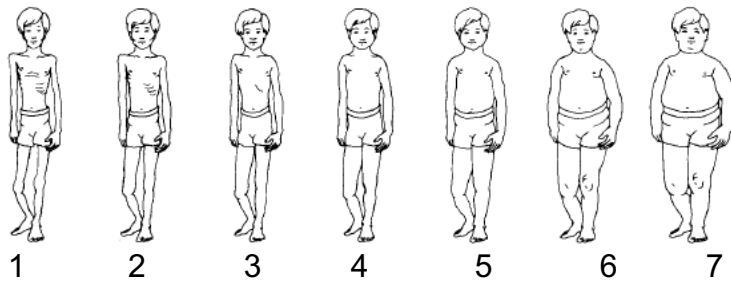
BODY FIGURE PERCEPTION SCALE

T1, T2 Self-Report Measure of Body Dissatisfaction (Collins, 1991)

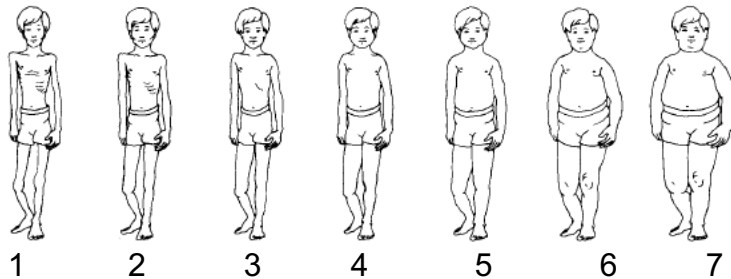
If you are a boy, please answer the two questions at the top of the page.
If you are a girl, please answer the two questions at the bottom of the page.

Boys

Which picture looks the most like you look?

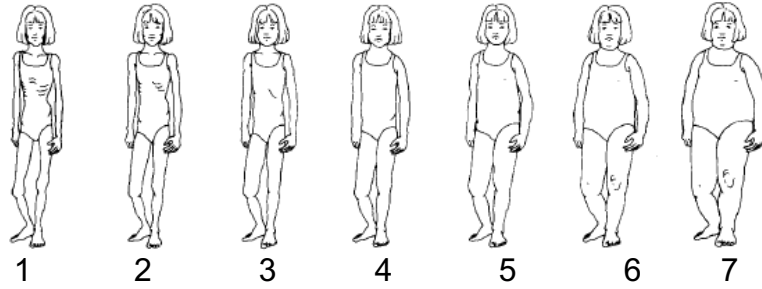


Which picture shows the way you want to look?

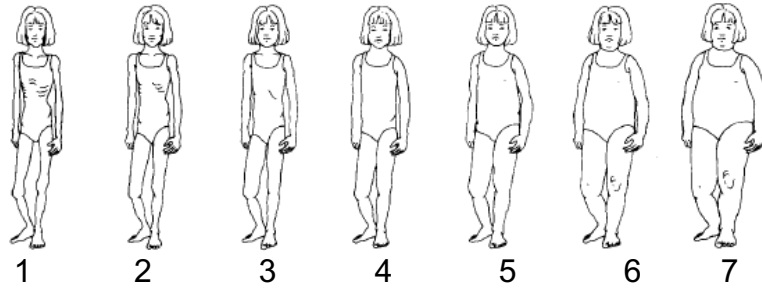


Girls

Which picture looks the most like you look?



Which picture shows the way you want to look?



Appendix C

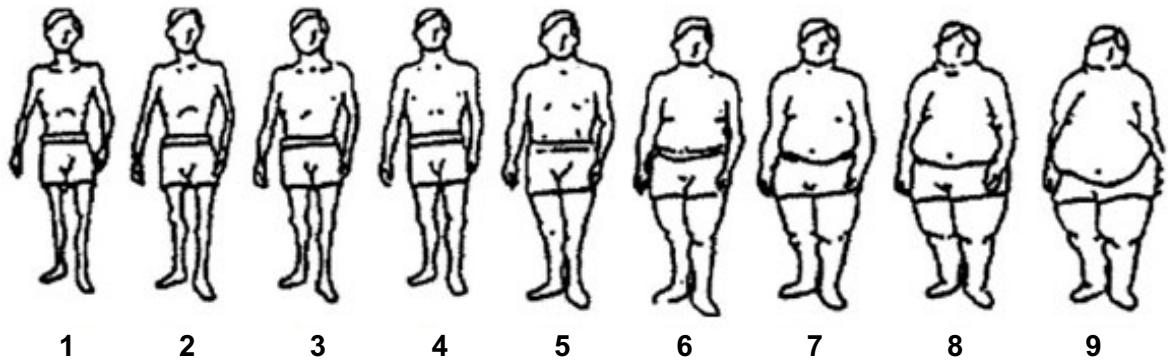
FIGURE RATING SCALE

T3 Self-Report Measure of Body Dissatisfaction (Stunkard, Sørensen, & Schlausinger, 1982)

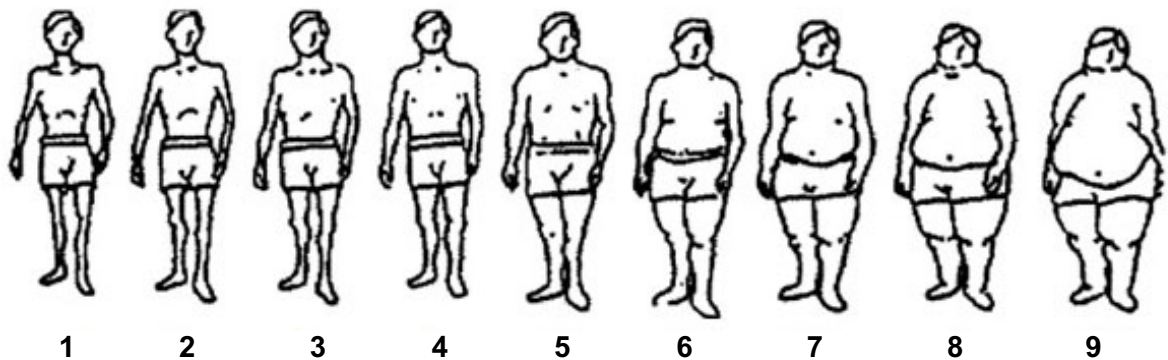
If you are a boy, please answer the two questions at the top of the page.
If you are a girl, please answer the two questions at the bottom of the page.

Boys

Which picture looks the most like you look?

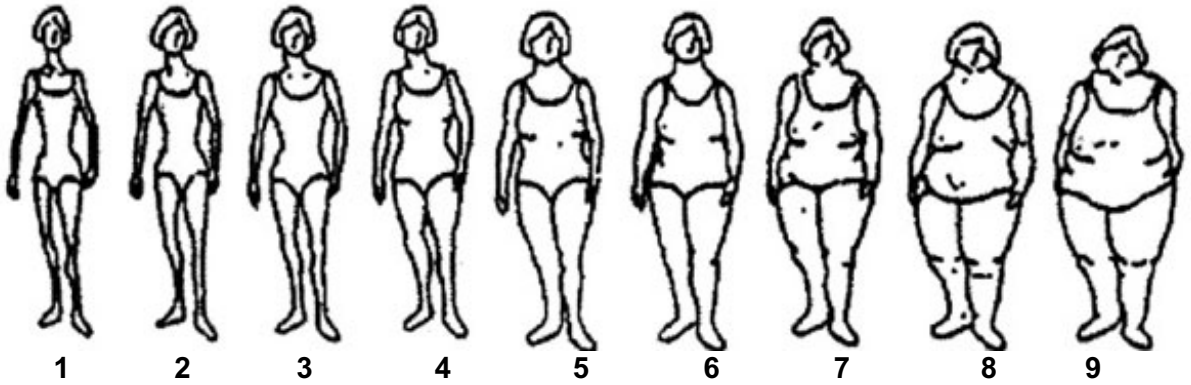


Which picture shows the way you want to look?

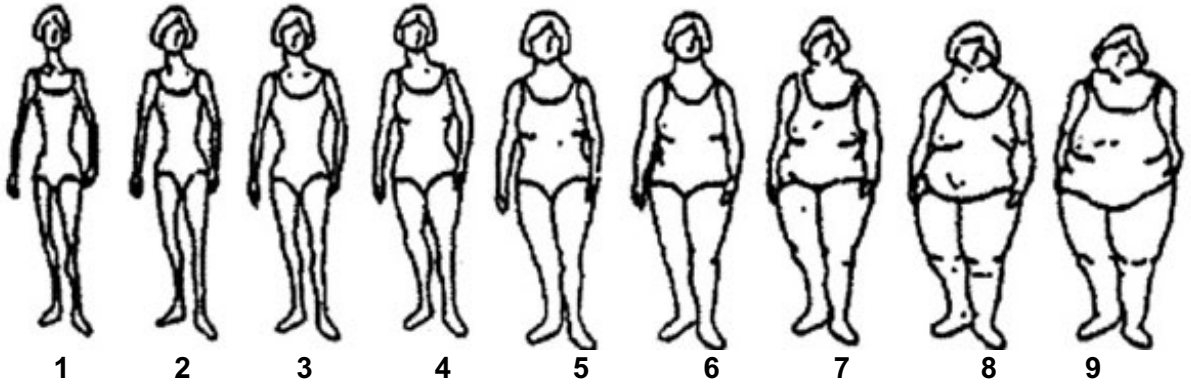


Girls

Which picture looks the most like you look?



Which picture shows the way you want to look?



Appendix D

SHORT OVERCONCERN WITH WEIGHT AND SHAPE SUBSCALE OF THE MCKNIGHT RISK FACTOR SURVEY

T1, T2 Self-Report Measure of Overconcern with Weight (McKnight Investigators, 2003)

Here are some sentences about some different feelings you may have had. For each sentence, circle how often you have felt this way in the past year. If you felt this way a whole lot, circle 5. If you felt this way a lot, circle 4. If you felt this way sometimes, circle 3. If you felt this way a little, circle 2. If you have not felt this way at all, circle 1. Remember, all kids are different, so there are no right or wrong answers. Just answer how often you felt this way in the past year.

1. In the past year, how often have you felt fat?	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
2. In the past year, how often have you thought about wanting to be thinner?	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
3. In the past year, how much has your weight made a difference in how you feel about yourself?	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot

Appendix E

FULL OVERCONCERN WITH WEIGHT AND SHAPE SUBSCALE OF THE MCKNIGHT RISK FACTOR SURVEY

T3 Self-Report Measure of Overconcern with Weight (McKnight Investigators, 2003)

Here are some sentences about some different feelings you may have had. For each sentence, circle how often you have felt this way in the past year. If you felt this way a whole lot, circle 5. If you felt this way a lot, circle 4. If you felt this way sometimes, circle 3. If you felt this way a little, circle 2. If you have not felt this way at all, circle 1. Remember, all kids are different, so there are no right or wrong answers. Just answer how often you felt this way in the past year.

1. In the past year, how often have you worried about having fat on your body?	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
2. In the past year, how often have you felt fat?	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
3. In the past year, how often have you thought about wanting to be thinner?	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
4. In the past year, how much have you worried about gaining two pounds?	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot

5. In the past year, how much has your weight made a difference in how you feel about yourself?	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
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Appendix F

CHILDREN'S DEPRESSION INVENTORY 2 SELF-REPORT SHORT VERSION

T1, T2, T3 Self-Report Measure of Depression (Kovacs, 2011)

Kids sometimes have different feelings and ideas.

This form lists the feelings and ideas in groups. From each group of three sentences, pick **one** sentence that describes you best for the **past two weeks**. After you pick a sentence from the first group, go on to the next group.

There is no right or wrong answer. Just pick the sentence that best describes the way you have been recently. Put a mark like this **X** next to your answer. Put the mark in the box next to the sentence that you pick.

1.	☐ I am sad once in a while. ☐ I am sad many times. ☐ I am sad all the time.
2.	☐ Nothing will ever work out for me. ☐ I am not sure if things will work out for me. ☐ Things will work out for me O.K.
3.	☐ I do most things O.K. ☐ I do many things wrong. ☐ I do everything wrong.
4.	☐ I have fun in many things. ☐ I have fun in some things. ☐ Nothing is fun at all.

5.	☐ I am important to my family. ☐ I am not sure if I am important to my family. ☐ My family is better off without me.
6.	☐ I hate myself. ☐ I do not like myself. ☐ I like myself.
7.	☐ I feel cranky all the time. ☐ I feel cranky many times. ☐ I am almost never cranky.
8.	☐ I cannot make up my mind about things. ☐ It is hard to make up my mind about things. ☐ I make up my mind about things easily.
9.	☐ I have to push myself all the time to do my schoolwork. ☐ I have to push myself many times to do my schoolwork. ☐ Doing schoolwork is not a big problem.
10.	☐ I am tired once in a while. ☐ I am tired many days. ☐ I am tired all the time.
11.	☐ Most days I do not feel like eating. ☐ Many days I do not feel like eating. ☐ I eat pretty well.
12.	☐ I do not feel alone. ☐ I feel alone many times. ☐ I feel alone all the time.

Appendix G

MULTIDIMENSIONAL ANXIETY SCALE FOR CHILDREN - 10

T1, T2 Self-Report Measure of Anxiety (March, 1997)

This questionnaire asks you how you have been thinking, feeling, or acting recently. For each item, please circle the number that shows how often the statement is true for you. If a sentence is true about you a lot of the time, circle 4. If it is true about you some of the time, circle 3. If it is true about you once in a while, circle 2. If a sentence is not ever true about you, circle 1. Remember, there are no right or wrong answers, just answer how you have been feeling recently.

1. The idea of going away to camp scares me.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
2. I'm afraid that other kids will make fun of me.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
3. I try to stay near my mom or dad.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
4. I get dizzy or faint feelings.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
5. I feel restless or on edge.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
6. I feel sick to my stomach.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me

7. I get nervous if I have to perform in public.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
8. Bad weather, the dark, heights, animals, or bugs scare me.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
9. I check to make sure things are safe.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
10. I feel shy.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me

Appendix H

MULTIDIMENSIONAL ANXIETY SCALE FOR CHILDREN

T3 Self-Report Measure of Anxiety (March, 1997)

This questionnaire asks you how you have been thinking, feeling, or acting recently. For each item, please circle the number that shows how often the statement is true for you. If a sentence is true about you a lot of the time, circle 4. If it is true about you some of the time, circle 3. If it is true about you once in a while, circle 2. If a sentence is not ever true about you, circle 1. Remember, there are no right or wrong answers, just answer how you have been feeling recently.

1. I feel tense or uptight	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
2. I usually ask permission	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
3. I worry about other people laughing at me	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
4. I get scared when my parents go away	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
5. I have trouble getting my breath	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
6. I keep my eyes open for danger	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me

7. The idea of going away to camp scares me	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
8. I get shaky or jittery	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
9. I try to stay near my mom or dad	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
10. I'm afraid that other kids will make fun of me	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
11. I try hard to obey my parents and teachers	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
12. I get dizzy or faint feelings	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
13. I check things out first	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
14. I worry about getting called on in class	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
15. I'm jumpy	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
16. I'm afraid other people will think I'm stupid	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
17. I keep the light on at night	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me

18. I have pains in my chest	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
19. I avoid going to places without my family	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
20. I feel strange, weird, or unreal	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
21. I try to do things other people will like	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
22. I worry about what other people think of me	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
23. I avoid watching scary movies and TV shows	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
24. My heart races or skips beats	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
25. I stay away from things that upset me	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
26. I sleep next to someone from my family	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
27. I feel restless and on edge	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
28. I try to do everything exactly right	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me

29. I worry about doing something stupid or embarrassing	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
30. I get scared riding in the car or on the bus	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
31. I feel sick to my stomach	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
32. If I get upset or scared, I let someone know right away	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
33. I get nervous if I have to perform in public	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
34. Bad weather, the dark, heights, animals, or bugs scare me	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
35. My hands shake	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
36. I check to make sure things are safe	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
37. I have trouble asking other kids to play with me	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
38. My hands feel sweaty or cold	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me

39. I feel shy	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
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Appendix I

CHILD SOCIAL PREFERENCE SCALE - REVISED

T3 Self-Report Measure of Withdrawal (Bowker & Raja, 2011; Nelson, 2013)

This questionnaire asks you how you have been thinking, feeling, or acting recently. For each item, please circle the number that shows how often the statement is true for you. If a sentence is true about you a whole lot of the time, circle 5. If it is true about you a lot of the time, circle 4. If it is true about you some of the time, circle 3. If it is true about you once in a while, circle 2. If a sentence is not ever true about you, circle 1. Remember, there are no right or wrong answers, just answer how you have been feeling recently.

1. I tend to be shy.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
2. I'm just as happy to be by myself as with other people.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
3. I like to be with people.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
4. I want to hang out with others, but often they don't want to be with me.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot

5. I'd like to hang out with other people, but sometimes I'm nervous to.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
6. I don't really mind spending time alone.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
7. I am the happiest when I am hanging out with other people.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
8. Sometimes people don't want me to hang out with them.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
9. Although I desire to talk to and be with other people, I feel nervous about interacting with them.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
10. I don't have a strong need to be with other people.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot

11. When given the choice, I prefer to do something with others than to be alone.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
12. I wish I could spend more time with other people, but they won't let me.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
13. I feel tense in social situations.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
14. I like spending time alone more than I like spending time with other people.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
15. I welcome the opportunity to mix socially with people.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
16. I'd like to hang out with other people, but I'm often excluded.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot

17. Sometimes I turn down chances to hang out with other people because I feel too shy.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
18. I prefer working with others rather than alone.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
19. I feel nervous at parties and other social settings.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot
20. I don't really like being with other people and prefer being alone.	1 Not at all	2 A little	3 Sometimes	4 A lot	5 A whole lot

Appendix J

WITHDRAWAL SUBSCALE OF THE BEHAVIOR ASSESSMENT SYSTEM FOR CHILDREN 2, TEACHER RATING SCALE

T1, T2 Teacher-Report Measure of Withdrawal (Reynolds & Kamphaus, 2004)

The following items are phrases that describe how children may act. Please read each phrase, and mark the response that describes how this child has behaved recently (in the last several months).

Circle **1** if the behavior **never** occurs.

Circle **2** if the behavior **sometimes** occurs.

Circle **3** if the behavior **often** occurs.

Circle **4** if the behavior **almost always** occurs.

If you don't know or are unsure of your response to an item, give your best estimate. A "Never" response does not mean that the child "never" engages in a behavior, only that you have not observed the child to behave that way.

1. Refuses to join group activities.	1 Never	2 Sometimes	3 Often	4 Almost Always
2. Refuses to talk.	1 Never	2 Sometimes	3 Often	4 Almost Always
3. Makes friends easily.	1 Never	2 Sometimes	3 Often	4 Almost Always
4. Plays alone.	1 Never	2 Sometimes	3 Often	4 Almost Always
5. Quickly joins group activities.	1 Never	2 Sometimes	3 Often	4 Almost Always
6. Avoids other children.	1 Never	2 Sometimes	3 Often	4 Almost Always

7. Is chosen last by other children for games.	1 Never	2 Sometimes	3 Often	4 Almost Always
8. Has trouble making new friends.	1 Never	2 Sometimes	3 Often	4 Almost Always

Appendix K

SOMATIZATION SUBSCALE OF THE BEHAVIOR ASSESSMENT SYSTEM FOR CHILDREN 3, SELF REPORT OF PERSONALITY

T3 Self-Report Measure of Somatization (Reynolds & Kamphaus, 2015)

This questionnaire asks you how you have been thinking, feeling, or acting recently. For each item, please circle the number that shows how often the statement is true for you. If a sentence is true about you a lot of the time, circle 4. If it is true about you some of the time, circle 3. If it is true about you once in a while, circle 2. If a sentence is not ever true about you, circle 1. Remember, there are no right or wrong answers, just answer how you have been feeling recently.

1. Often I feel sick to my stomach.	1 Never true about me	2 Sometimes true about me	3 Often true about me	4 Always true about me
2. It seems like I'm always sick.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
3. I get sick more than others.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
4. My stomach gets upset more than most people's	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
5. I am in pain	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
6. I have trouble breathing.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me

7. I feel dizzy.	1 Never true about me	2 Rarely true about me	3 Sometimes true about me	4 Often true about me
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Appendix L

SOMATIZATION SUBSCALE OF THE BEHAVIOR ASSESSMENT SYSTEM FOR CHILDREN 2, TEACHING RATING SCALE

T1, T2 Teacher-Report Measure of Somatization (Reynolds & Kamphaus, 2004)

The following items are phrases that describe how children may act. Please read each phrase, and mark the response that describes how this child has behaved recently (in the last several months).

Circle **1** if the behavior **never** occurs.

Circle **2** if the behavior **sometimes** occurs.

Circle **3** if the behavior **often** occurs.

Circle **4** if the behavior **almost always** occurs.

If you don't know or are unsure of your response to an item, give your best estimate. A "Never" response does not mean that the child "never" engages in a behavior, only that you have not observed the child to behave that way.

1. Complains about health.	1 Never	2 Sometimes	3 Often	4 Almost Always
2. Has headaches.	1 Never	2 Sometimes	3 Often	4 Almost Always
3. Visits the school nurse.	1 Never	2 Sometimes	3 Often	4 Almost Always
4. Has stomach problems.	1 Never	2 Sometimes	3 Often	4 Almost Always
5. Has fevers.	1 Never	2 Sometimes	3 Often	4 Almost Always
6. Complains of shortness of breath.	1 Never	2 Sometimes	3 Often	4 Almost Always

7. Complains of pain.	1 Never	2 Sometimes	3 Often	4 Almost Always
8. Is afraid of getting sick.	1 Never	2 Sometimes	3 Often	4 Almost Always
9. Gets sick.	1 Never	2 Sometimes	3 Often	4 Almost Always

Appendix M

SCHOOL REFUSAL ASSESSMENT SCALE – REVISED – CHILD

T3 Self-Report Measure of School Avoidance (Kearney, 2002)

This questionnaire asks you how you have been thinking, feeling, or acting recently. For each item, please circle the number that shows how often the statement is true for you. If a sentence is true about you all the time, circle 6. If it is true about you a whole lot of the time, circle 5. If it is true about you a lot of the time, circle 4. If it is true about you some of the time, circle 3. If it is true about you once in a while, circle 2. If a sentence is not ever true about you, circle 1. Remember, there are no right or wrong answers, just answer how you have been feeling recently.

1. How often do you have bad feelings about going to school because you are afraid of something related to school? (e.g., tests, school bus, teacher, fire alarm?)	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
2. How often do you stay away from school because it is hard to speak with the other kids at school?	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
3. How often do you stay away from school because you will feel sad or depressed if you go?	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always

4. How often do you stay away from school because you feel embarrassed in front of other people at school?	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
5. How often do you feel worse at school (e.g., scared, nervous, sad) compared to how you feel at home with friends?	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
6. How often do you stay away from school because you do not have many friends there?	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
7. How often do you have bad feelings about school (e.g., scared, nervous, sad) when you think about school on Saturday and Sunday?	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
8. How often do you stay away from places in school (e.g., hallways, places where certain groups of people are) where you would have to talk to someone?	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
9. If you had less bad feelings (e.g., scared, nervous, sad) about school, would it be easier for you to go to	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always

school?						
10. If it were easier for you to make new friends, would it be easier for you to go to school?	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
11. How much more do you have bad feelings about school (e.g., scared, nervous, sad) than other kids your age?	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
12. How often do you stay away from people in school compared to other kids your age?	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always

Appendix N

SCHOOL AVOIDANCE SUBSCALE OF THE TEACHER RATING SCALE OF SCHOOL ADJUSTMENT

T1, T2 Teacher-Report Measure of School Avoidance (Ladd, Kochenderfer, & Coleman, 1996; Birch & Ladd, 1997)

The following items are phrases that describe how children may act. Please read each phrase, and mark the response that describes how this child has behaved recently (in the last several months).

Circle **1** if the behavior **does not apply**.

Circle **2** if the behavior **applies sometimes**.

Circle **3** if the behavior **certainly applies**.

If you don't know or are unsure of your response to an item, give your best estimate. A "Never" response does not mean that the child "never" engages in a behavior, only that you have not observed the child to behave that way.

1. Makes up reasons to go home from school.	1 Does not apply	2 Applies Sometimes	3 Certainly Applies
2. Asks to see school nurse.	1 Does not apply	2 Applies Sometimes	3 Certainly Applies
3. Complains about school.	1 Does not apply	2 Applies Sometimes	3 Certainly Applies
4. Feigns illness at school.	1 Does not apply	2 Applies Sometimes	3 Certainly Applies
5. Asks to leave the classroom.	1 Does not apply	2 Applies Sometimes	3 Certainly Applies
6. Asks how long it is until it is time to go home.	1 Does not apply	2 Applies Sometimes	3 Certainly Applies

Appendix O

CHILDREN'S EATING ATTITUDES TEST

T3 Self-Report Measure of Disordered Eating (Maloney, McGuire, & Daniels, 1988)

This questionnaire asks you how you have been thinking, feeling, or acting recently. For each item, please circle the number that shows how often the statement is true for you. If a sentence is true about you all the time, circle 6. If it is true about you a whole lot of the time, circle 5. If it is true about you a lot of the time, circle 4. If it is true about you some of the time, circle 3. If it is true about you once in a while, circle 2. If a sentence is not ever true about you, circle 1. Remember, there are no right or wrong answers, just answer how you have been feeling recently.

1. I am scared about being overweight.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
2. I stay away from eating when I am hungry.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
3. I think about food a lot of the time.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
4. I have gone on eating binges where I feel that I might not be able to stop.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
5. I cut my food into small pieces.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
6. I am aware of the energy (calorie) content in the foods that I eat.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always

7. I try to stay away from foods such as breads, potatoes, and rice.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
8. I feel that others would like me to eat more.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
9. I vomit after I have eaten.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
10. I feel very guilty after eating.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
11. I think a lot about wanting to be thinner.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
12. I think about burning up energy (calories) when I exercise.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
13. Other people think I am too thin.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
14. I think a lot about having fat on my body.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
15. I take longer than others to eat my meals.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
16. I stay away from foods with sugar in them.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
17. I eat diet foods.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always

18. I think that food controls my life.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
19. I can show self-control around food.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
20. I feel that others pressure me to eat.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
21. I give too much time and thought to food.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
22. I feel uncomfortable after eating sweets.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
23. I have been dieting.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
24. I like my stomach to be empty.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
25. I enjoy trying new rich foods.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always
26. I have the urge to vomit after eating.	1 Never	2 Rarely	3 Sometimes	4 Often	5 Very often	6 Always

Appendix P

PHYSICAL ACTIVITY QUESTIONNAIRE - ADOLESCENTS

Physical Activity Questionnaire - Adolescents T3 Self-Report Measure of Physical Inactivity (Kowalski, Crocker, & Kowalski, 1997)

We are trying to find out about your level of physical activity from the last **7 days** (in the last week). This includes sports or dance that make you sweat or make your legs feel tired, or games that make you breathe hard, like tag, skipping, running, climbing, and others.

1. Have you done any of the following activities in the past week? If yes, how many times? (Circle one per row).

a) Skipping	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
b) Rowing/canoeing	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
c) In-line skating	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
d) Tag	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
e) Walking for exercise	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
f) Bicycling	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
g) Jogging or running	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more

h) Aerobics	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
i) Swimming	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
j) Baseball, softball	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
k) Dance	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
l) Football	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
m) Badminton	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
n) Skateboarding	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
o) Soccer	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
p) Street hockey	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
q) Volleyball	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
r) Floor hockey	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
s) Basketball	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
t) Ice skating	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more

u) Cross-country skiing	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
v) Ice hockey	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more
w) Other: _____ _____	1 No	2 1-2 times	3 3-4 times	4 5-6 times	5 7 times or more

2. In the last 7 days, during your physical education (PE) classes, how often were you very active (playing hard, running, jumping, throwing)? (Circle one only).

1 I don't do PE	2 Hardly Ever	3 Sometimes	4 Quite Often	5 Always
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3. In the last 7 days, what did you normally do *at lunch* (besides eating lunch)? Check one only).

1 Sat down (talking, reading, doing schoolwork)	2 Stood around or walked around	3 Ran or played a little bit	4 Ran around and played quite a bit	5 Ran around and played hard most of the time
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4. In the last 7 days, on how many days *right after school*, did you do sports, dance, or play games in which you were very active? (Circle one only.)

1 None	2 1 time last week	3 2-3 times last week	4 4 times last week	5 5 times last week
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5. In the last 7 days, on how many evenings did you do sports, dance, or play games in which you were very active? (Circle one only.)

1 None	2 1 time last week	3 2-3 times last week	4 4 times last week	5 5 times last week
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6. *On the last weekend*, how many times did you do sports, dance, or play games in which you were very active? (Circle one only.)

1 None	2 1 time last week	3 2-3 times last week	4 4 times last week	5 5 times last week
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7. Which *one* of the following describes you best for the last 7 days? Read *all five* statements before deciding on the *one* answer that best describes you.

1	All or most of my free time was spent doing things that involve little physical effort.
2	I sometimes (1-2 times last week) did physical things in my free time (e.g., played sports, went running, swimming, bike riding, did aerobics)
3	I often (3-4 times) did physical things in my free time
4	I quite often (5-6 times last week) did physical things in my free time
5	I very often (7 or more times last week) did physical things in my free time

8. Mark how often you did physical activity (like playing sports, games, doing dance, or any other physical activity) for each day last week.

Monday	1 None	2 Little bit	3 Medium	4 Often	5 Very often
Tuesday	1 None	2 Little bit	3 Medium	4 Often	5 Very often
Wednesday	1 None	2 Little bit	3 Medium	4 Often	5 Very often
Thursday	1 None	2 Little bit	3 Medium	4 Often	5 Very often
Friday	1 None	2 Little bit	3 Medium	4 Often	5 Very often
Saturday	1 None	2 Little bit	3 Medium	4 Often	5 Very often
Sunday	1 None	2 Little bit	3 Medium	4 Often	5 Very often

9. Were you sick last week, or did anything prevent you from doing your normal physical activities? (check one.)

1 No	2 Yes
	What prevented you?

Appendix Q

PUBERTAL DEVELOPMENT SCALE

T3 Parent-Report Measure of Pubertal Status (Petersen, Crockett, Richards, & Boxer, 1988)

Because some of the following questions are very personal, parents often ask us why we are interested in their children's physical development. Our reasons are quite simple. Physical development is one of the most important, if not *the* most important, changes a teenager will experience.

To answer each question, please check the box in front of the answer that best describes what is happening to your child right now. Please choose only one answer for this question.

Female Questions

1. Would you say that your child's growth in height (getting taller)
 - ☐ Has not yet begun to spurt ("spurt" means more growth than usual)
 - ☐ Has barely started to spurt
 - ☐ Has definitely started to happen, but is not finished
 - ☐ Seems completed (your child is about as tall as they are going to get).
2. How about the growth of body hair (e.g, under her arms)? Would you say that your child's body hair has:
 - ☐ Not started growing
 - ☐ Barely started growing
 - ☐ Definitely started growing, but is not finished
 - ☐ Seems completed (your child has as much body hair as she is going to get)
3. Have you noticed any skin changes in your child, especially pimples?
 - ☐ Not yet started showing changes
 - ☐ Has barely started showing changes
 - ☐ Skin changes have definitely started but are not finished
 - ☐ Skin changes seem completed.

4. Have your child's breasts begun to grow?
- ☐ Not yet started growing
 - ☐ Have barely started growing
 - ☐ Breast growth has definitely started but is not finished
 - ☐ Breast growth seems completed.
5. Has your child begun to menstruate? ("menstruate" means get her period).
- ☐ No
 - ☐ Yes

If you answered yes, how old was your child when she first got her period?

Male Questions

1. Would you say that your child's growth in height (getting taller)
- ☐ Has not yet begun to spurt ("spurt" means more growth than usual)
 - ☐ Has barely started to spurt
 - ☐ Has definitely started to happen, but is not finished
 - ☐ Seems completed (your child is about as tall as they are going to get).
2. How about the growth of body hair (e.g, under her arms)? Would you say that your child's body hair has:
- ☐ Not started growing
 - ☐ Barely started growing
 - ☐ Definitely started growing, but is not finished
 - ☐ Seems completed (your child has as much body hair as she is going to get)
3. Have you noticed any skin changes in your child, especially pimples?
- ☐ Not yet started showing changes
 - ☐ Has barely started showing changes
 - ☐ Skin changes have definitely started but are not finished
 - ☐ Skin changes seem completed.

4. Has your child's voice started to change?
- ☐ Not yet started changing
 - ☐ Has barely started changing
 - ☐ Voice change is definitely happening but is not finished
 - ☐ Voice change seems completed
5. Has your child started to grow facial hair (beard or mustache)?
- ☐ Not yet started growing facial hair
 - ☐ Has barely started growing facial hair
 - ☐ Hair growth has definitely started (enough to shave)
 - ☐ Probably grows now as fast as it will ever grow

Appendix R

T3 PARENT-REPORT MEASURE OF FAMILY DEMOGRAPHICS

Your Home Zip Code _____

Your Home Address _____

We would like to learn more about the child's home environment and about the child's primary caregiver. Please read all options before choosing an answer. If you are unsure of an answer, please choose the option that best describes your situation.

1. How are you related to the child?

- a. mother
- b. father
- c. grandmother
- d. grandfather
- e. other _____

Primary Language spoken at home:

Part I: Information about the primary caregiver.

2. What is your age? _____

3. What is the highest grade that you completed in school? _____

4. What is your current relationship status?

- a. living with a partner
- b. single
- c. married
- d. separated
- e. divorced
- f. other _____

5. How many major changes in relationship status have you experienced over the past two years? Examples include marriage, divorce, separation, moving in with partner, moving away from partner.

0 1 2 3 4+

6. If you work, what is your job? _____

Part II: Information about the child's home environment.

7. How many adults (18 and older) currently live in the child's household, including yourself?

1 2 3 4 5+

8. How many children currently live in the child's household, including the child?

1 2 3 4 5+

10. Please approximate your family's total yearly income from all sources (including employment, child support, disability, social security, welfare, worker's compensation, and retirement) Include income from employment for all adults living in the home. Please check the box next to your answer.

- ☐ \$0 - \$20,000
- ☐ \$20,000 - \$50,000
- ☐ \$50,000 - \$100,000
- ☐ \$100,000 - \$150,000
- ☐ \$150,000 or more

Appendix S

IRB APPROVAL TIME 1 AND TIME 2



RESEARCH OFFICE

210 Hullißen Hall
University of Delaware
Newark, Delaware 19716-1551
Ph: 302/831-2136
Fax: 302/831-2828

DATE: June 19, 2013

TO: Julie Hubbard, Ph.D.
FROM: University of Delaware IRB

STUDY TITLE: [338571-3] Evaluating the KiVa Bullying Prevention Program in Delaware Schools

SUBMISSION TYPE: Continuing Review/Progress Report

ACTION: APPROVED

APPROVAL DATE: June 19, 2013

EXPIRATION DATE: June 18, 2014

REVIEW TYPE: Full Committee Review

Thank you for your submission of Continuing Review/Progress Report materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Full Committee Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Jody-Lynn Berg at (302) 831-1119 or jlberg@udel.edu. Please include your study title and reference number in all correspondence with this office.

Appendix T

IRB APPROVAL TIME 3



RESEARCH OFFICE

210 Halliher Hall
University of Delaware
Newark, Delaware 19716-1551
Ph: 302/831-2136
Fax: 302/831-2828

DATE: May 25, 2017

TO: Julie Hubbard
FROM: University of Delaware IRB

STUDY TITLE: [971639-4] The Consequences of Weight-Related Victimization for Adolescents

SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED

APPROVAL DATE: May 25, 2017

EXPIRATION DATE: October 18, 2017

REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review 45 CFR 46. 110 (b)(2)

Thank you for your submission of Amendment/Modification materials for this research study. The University of Delaware IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All sponsor reporting requirements should also be followed.

Please report all NON-COMPLIANCE issues or COMPLAINTS regarding this study to this office.

Please note that all research records must be retained for a minimum of three years.

Based on the risks, this project requires Continuing Review by this office on an annual basis. Please use the appropriate renewal forms for this procedure.

If you have any questions, please contact Nicole Farnese-McFarlane at (302) 831-1119 or nicolefm@udel.edu. Please include your study title and reference number in all correspondence with this office.