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# Thin-Ideal Internalization, Body Misperception, and Their Association with Weight Control Behaviors Among Adolescent Girls

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Thin-Ideal Internalization, Body Misperception, and Their Association with  
Weight Control Behaviors among Adolescent Girls

Erin Moore

A thesis submitted to the faculty of  
Brigham Young University  
in partial fulfillment of the requirements for the degree of

Master of Science

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## ABSTRACT

### Thin-Ideal Internalization, Body Misperception, and Their Association with Weight Control Behaviors among Adolescent Girls

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Negative body image and preoccupation with weight are the norm for most women and girls in Western society, despite their potentially harmful consequences for psychological and physical wellness. While we know that many in this population experience negative feelings towards their bodies, we do not know if their beliefs about their body size are accurate and what effect a correct or incorrect assessment of one's body size has in terms of actual behavior. I examine this question among adolescent girls using data from the 2002 Health Behaviors in School-Age Children Survey. With a sample of 2,784 girls between the ages of 11 and 17, I run Poisson regression models to assess the relationship between actual and perceived body size and healthy versus unhealthy weight control behaviors, controlling for a number of indicators known to be associated with weight control, including parent and peer relationships, media exposure, and age of first menstruation. Results indicate that a discrepancy between actual and perceived body size is associated with increases in both positive and negative weight control behaviors, though the association with negative weight control behaviors is much larger. Starting puberty later is associated with a decrease in both types of these behaviors. Difficult family relationships appear to be more strongly associated with negative weight control than positive weight control. Other associations are discussed and suggestions for future research are offered.

Keywords: body image, weight control, body size, adolescent girls

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## INTRODUCTION

Approximately twenty-four million people suffer from eating disorders in the United States, the majority of which are female. In eighty-six percent of cases, the illness has onset by age twenty, indicating that adolescent girls are most susceptible to these disorders (ANAD 2011). The crisis of eating disorders is an epidemic among young girls, and the consequences are devastating. In addition to the millions of women who meet the clinical requirements for an eating disorder diagnosis, many more possess distorted perceptions of their bodies which lead them to engage in weight control behaviors. *Weight control behaviors* are physical actions taken to alter, and presumably decrease, one's body size. They tend to involve the regulation of food intake (Mackey and Greca 2008), though other behaviors are also used. Some behaviors are explicitly harmful, such as vomiting, while others have more ambiguous effects; exercise, for example, is healthy in moderation but can be extremely harmful when used in excess.

Previous research examining weight control behaviors identifies the most prominent types of behaviors and distinguishes between those that are healthy and those that are unhealthy. Common behaviors considered unhealthy include taking diet pills, vomiting, using laxatives, using diuretics, fasting, using food substitutes, eating very little food, skipping meals, and smoking cigarettes (Eisenberg et al. 2005; Neumark-Sztainer et al. 2006). Known healthy weight control behaviors include exercising, eating more fruits and vegetables, eating less fat, and eating fewer sweets (Neumark-Sztainer et al. 2006). It is important to note that though these behaviors are generally considered healthy, in excess they can become detrimental to health and even life threatening. Though only a minority of individuals resort to drastic measures like bingeing and purging or self-starvation, many young women use weight control behaviors unnecessarily,



demonstrating mental distortions similar to those suffering from eating disorders. I refer to these distortions as *body misperceptions*.

Body misperceptions are related to but distinct from *negative body perceptions*. A negative body perception is a belief that one's physical body deviates from the excessively thin, ideal standard; this belief is common among women and girls in Western society (Brumberg 1997; Thompson et al. 1999; Vitousek and Orimoto 1993). A *body misperception* is a different belief. By this, I refer to inaccuracy of a negative body perception—in other words, a girl's belief that her body is too big is false, according to official and more realistic health standards. Generally this involves believing that one is “fat,” when, according to national health standards, one is actually a healthy weight. Thompson describes this as “size perception accuracy” in reference to correct perception of the size of particular body parts (Thompson et al. 1999:10). While it is conceivable that someone might have a negative body perception and consequent body misperception in thinking she is *thinner* than she actually is, this research focuses on the converse perception.

This study is an examination of how body misperception relates to various types of weight control behaviors. Physical factors such as pubertal growth and physical activity are considered, and I explore the effect of other factors that have been connected to individuals' body-related perceptions and behaviors. I refer broadly to these other factors as sociocultural influences. In light of Thompson et al.'s (1999) theory of thin-ideal internalization, I attempt to uncover the association between these various influences and weight control behavior using nationally representative survey data. Specifically I account for influences from family (Ata, Ludden and Lally 2007), peers (Dohnt and Tiggeman 2006), and media (Heilman 1998). In this analysis, I ask two primary questions: first, to what extent does adolescent girls' perception of

their body size deviate from their actual body size? Essentially, to what extent do they possess a body misperception? Second, given the presence of such a deviation, what is the likelihood that an individual has recently engaged in weight control behaviors in the context of other personal factors and sociocultural influences?

## BACKGROUND

### *Review of Cognitive Models of Eating Pathology*

This study examines healthy and unhealthy weight control behavior in a sample from the general population of adolescent girls in the United States, paying special attention to the relationship between inaccurately perceived body size and weight control behaviors. There is extensive literature on this relationship as it pertains to the development of eating pathologies like anorexia nervosa and bulimia nervosa. This sample is not comprised of individuals with eating disorders, although theoretically they are represented in the study. Though my population of interest is much broader, reviewing research on the cognitive processes associated with the development of eating pathologies adds important context by conveying how body misperceptions, which are quite common, can and do develop into illnesses characterized by psychological distortion and physical harm.

As the population of individuals suffering from eating disorders becomes larger, it also becomes more heterogeneous, and the cognitive models devised to explain these behaviors increase in number and complexity (Vitousek and Orimoto 1993). Most studies focus specifically on the development of bulimic pathology or on general eating pathologies. It has been suggested that anorexic pathologies might function differently and should be separated out from pathologies of bulimia, obesity, and binge eating (Stice 2002). Despite the limitations of generalized investigations, support has been found for a number of common risk factors.

Essentially, cognitive models assume that eating disorder symptoms are founded in the overvaluation of ideas about body weight and shape (Vitousek 1996). Ideas about body weight and shape are examined via perceptions and behaviors like perceived pressure to be thin, internalization of the thin-ideal, body dissatisfaction, binge eating, and perfectionism, all of which have garnered support as risk factors for eating pathologies (Stice 2002; Stice and Agras 1998). Interestingly, dieting itself has received mixed support as being predictive of eating pathology; an experimental test relating dieting to bulimic pathology as well as a meta-analytic review found only weak support for dieting as a risk factor (Presnell and Stice 2003; Stice 2002), but multivariate pathway models suggest that dieting has a mediating effect between body dissatisfaction and bulimic symptoms (Stice 2001).

Other psychological and physical conditions have been related to the initial development of eating pathologies. Many cognitive models stress the necessity of preexisting psychological characteristics, including low self-esteem, over compliance, perfectionism, grandiosity, and asceticism (Vitousek and Orimoto 1993). Researchers posit that particularly for anorexic behaviors, one must first possess these personality characteristics, and symptomology follows with the addition of sociocultural pressure to be thin and one or more stressful life events (Vitousek and Orimoto 1993).

There is mixed evidence that actual body mass is also a risk factor for eating pathologies; Stice's (2002) extensive meta-analysis of risk factors found that body mass might promote pathology development but not pathology maintenance. Other longitudinal work has found only weak connections between body mass and dieting (Stice et al. 1998). In terms of other physical factors, little support has been found for the claim that early menarche is a risk factor, although researchers speculate that this may be due to the overemphasis of previous studies on samples of

pre-adolescents and early adults; it is likely that early menarche will more prominently connect to eating pathologies when they are the most common—early adolescence. Thus future research should focus on this age group (Stice 2002).

Thin-ideal internalization is one concept related to perceptions about body shape and weight that is often included in cognitive models on eating pathology. Stice (2001) finds support for thin-ideal internalization as predictive of body dissatisfaction; thin-ideal internalization and pressure to be thin are the initial conditions of the dual-pathway model of bulimic pathology, which has been strongly supported in a number of investigations (Stice 2001; Stice 2002). Theoretically, pressure to be thin operates concurrently with the thin-ideal by reinforcing it, promoting adolescents' internalization of the thin-ideal and their pursuit of the ideal through dieting (Stice and Agras 1998). In focusing on this concept, I explore a sociocultural model of weight control behaviors, rather than a cognitive model—though these two types of models emphasize different individual characteristics that relate to weight control behaviors, both must be explored to produce comprehensive understanding of these phenomena among adolescent girls. In the following two sections, I describe thin-ideal internalization in greater detail and illustrate its connection to weight control behaviors.

### *Thin-Ideal Internalization*

The current literature emphasizes the relevance of thin-ideal internalization for the eating disorder population, but I argue that this theory helps us understand the phenomenon of body misperception among the broader population of adolescent girls. I now focus on the relevance of thin-ideal internalization for that general population of girls in the United States. Vitousek and Orimoto assert that “the equation of slenderness and happiness is a delusion that eating-disordered individuals share with much of Western society” (1993:196). This suggests the

detriments of thin-ideal internalization may have relevance for a broader group than just the eating disorder population. Regardless of actual weight, the *perception* of being overweight is cause for great emotional distress among girls, especially whites and Hispanics (Xiaoja, Regnerus and Cox 2001). In fact, cognitive models of eating pathologies hold the perception of fatness to be a foundational cognitive element for eating disorder development (Vitousek and Orimoto 1993). Deviating from society's physical ideal, however unrealistic, causes emotional insecurity, vulnerability, and seclusion, and it increases the risk for other psychological problems. Females are disproportionately affected by societal standards, reporting higher outside pressure to lose weight than males (Ata et al. 2007). Thompson describes the process through which external, sociocultural pressures create negative body image and promote weight control behaviors with *thin-ideal internalization* theory. As a concept, thin-ideal internalization is the extent to which individuals are persuaded by the external pressures to be thin, taking on beauty ideals by believing and then acting upon them (Thompson et al. 1999; Thompson and Stice 2001; Stice and Agras 1998). At the theoretical level, thin-ideal internalization explains the process by which one moves from external pressures to negative body image to weight control; this is described in terms of the consistency of sociocultural pressures from family, peers, and media, and the extent to which the ideals have been internalized (Thompson et al. 1999).

Thompson et al.'s (1999) thin-ideal internalization theory posits the presence of cognitive mechanisms that link the external pressures to be thin to the resultant negative body perception and weight control behavior. In order to make sense of social information, individuals rely on *availability heuristics*, a processing tool that draws upon the most readily accessible source of information to decipher new information presented; individuals recall whatever is at the forefront of their consciousness to understand new material. Thompson et al. (1999) emphasize, however,

that while this is an efficient way to process social experiences, it does not necessarily rely on accurate information. Thus it is possible for an individual to develop an effective way of processing relevant information that relies on false assumptions (Thompson et al. 1999).

### *Connecting Thin-Ideal Internalization to Body Image and Weight Control*

Of the various risk factors associated with eating pathology, thin-ideal internalization appears to be a very relevant consideration for general weight control, behavior that is not necessarily pathological. The belief that a thin body is ideal is a society-level phenomenon (Vitousek and Orimoto 1993) and this theory helps us understand how a broad cultural idea becomes real for the individual by influencing her thinking and behavior. Being continuously confronted with the cultural message of the thin-ideal, adolescent girls will likely draw upon that message in order to process new information (Thompson et al. 1999). Having internalized the thin-ideal, and given that the majority of the female population does not meet and is indeed incapable of meeting the thin-ideal, dissatisfaction with one's body is almost inevitable (Jones, Vigfusdottir and Lee 2004; Thompson et al. 1999). Additionally, having established the prevalence of negative body image, extensive research documents the connection between negative body image and various weight control behaviors (Ata et al. 2007; Field et al. 2001; Markey and Markey 2005).

Assuming the accuracy of thin-ideal internalization theory, this research attempts to measure the association between an inaccurately perceived body size and various types of weight control behavior. Current literature identifies family, peer, and media influences as the strongest communicators of the thin-ideal, and their effect appears to be magnified during puberty. With this research, I hope to better understand how adolescent American girls are thinking about their bodies, and how those ideas, as well as other personal factors relate to weight control, or action

taken to change the body. Additionally, though weight control behaviors are often examined under the broad category of “dieting behaviors,” I examine any differential effects these factors may hold in their associations with healthy and unhealthy weight control behaviors.

### *Pubertal Growth*

Research suggests that pubertal growth, generally measured in girls by age of first menarche, is the catalyst that begins the development of negative body perceptions and also weight control behaviors. (Brooks-Gunn and Warren 1988; Paikoff and Brooks-Gunn 1991). Body awareness is higher after menarche than before (Paikoff and Brooks-Gunn 1991). Additionally, bodily anxiety begins at menarche; during this transition, women report being detached from and in conflict with their bodies, a phenomenon which lingers through adulthood (Lee 1994). Presence of bodily anxiety at puberty is evidenced by the fact that post-menarcheal girls have higher rates of weight control than pre-menarcheal girls (O’Dea and Abraham 1999).

Pubertal weight gain is also associated with negative body perceptions which worsen with age. While early pubertal changes like breast development have positive social consequences, later physical changes bring rapid increases in body fat, which move girls away from the thin-ideal (Brooks-Gunn and Warren 1998). Though pubertal status has been found to be inconsistently associated with depression (MacPhee and Andrews 2006), post-menarchal girls who have gained weight perceive that they are not reaching the physical standards of the thin-ideal, a perceived failure which increases their risk for decreased self-esteem, psychosomatic complaints, and depressed moods (Xiaoja et al. 2001).

Body image problems that arise among girls during puberty appear to be getting more severe over time. Young women today begin puberty earlier than ever, the result of better nutrition and the eradication of once fatal diseases (Brumberg 1997). But while girls’ physical

maturation has accelerated, their psychological development continues at the same rate—this is evidenced by the higher rate of depressive symptoms among girls who have recently begun puberty (Stroud and Davila 2008). Additional historical changes involve parent-daughter relationships; adolescents today experience a greater degree of emotional separation from parents during puberty than teens historically and are lacking in adult mentorship (Brumberg 1997; Paikoff and Brooks-Gunn 1991). Because of these biological and social changes, young women today are less prepared to handle menstruation and pubertal growth, causing greater vulnerability to other socializing agents like peers and media and greater susceptibility to psychological problems like body image disorders.

### *Media Influence*

Extensive research establishes a correlation between negative body image and media intake. Women are bombarded by images of grossly unrealistic bodies in the media; though a healthy woman of normal weight has 22% to 25% body fat, the media presents actresses and models who have as little as 10% body fat (Heilman 1998). Consumption of this misinformation is associated with negative body image. Research tends to take one of two approaches in analyzing media consumption: in the experimental approach, feelings about body image and the thin-ideal are measured before and after participants are exposed to media images (Clay, Vignoles and Dittmar 2005). An alternative approach, which my study employs, measures the average amount of time during a given period that individuals spend with particular media outlets, such as television, computers, and fashion magazines (Anderson et al. 2001; Dohnt and Tiggemann 2006; Jones et al. 2004).

Researchers using both methods find an association between media intake and negative body image. One study found that women's magazines were negatively related to appearance



satisfaction (Dohnt and Tiggemann 2006). Specifically, it has been shown that exposure to images of uncommonly thin women has a decreasing effect on self-esteem which is mediated through decreased body satisfaction (Clay, Vignoles and Dittmar 2005). Additionally, girls who watch more television and read a wider variety of appearance-focused magazines have greater dieting awareness. Anderson et al. (2001) found television exposure to be consistently related to weight dissatisfaction. The same study found that 35% of all female subjects reported looking to entertainment and media figures as role models, implying that media images are indeed a standard against which individuals measure themselves (Anderson et al. 2001).

Although not all young women are exposed to the same level of media, Heilman (1998) theorizes that distance from media sources is overcome through relationships with peers. American culture is so inundated with media messages that even girls who are separated from the media, for example by parental restriction or lack of financial resources, are affected by the media's projected ideals, and they are therefore still susceptible to the thin-ideal and consequent development of a negative body image (Heilman 1998).

### *Family and Peer Influences*

The influence of family and peers also affects body perception. These relationships are measured in a number of ways; generally researchers try to assess the closeness of those relationships based on the amount of time spent together or the individuals' perceptions of how easily they can talk to friends or family members (Archibald, Graber and Brooks-Gunn 1999; Ata et al. 2007). Others use narrower measures and account for the frequency of appearance-related conversations (Field et al. 2001; Jones et al. 2004). Both approaches find that family and peer influences are associated with body perception, and they can be especially harmful when coupled with media influence. When family members establish thinness as a personal goal or

household norm, they create environments that emphasize thinness and confirm and legitimize the thin-ideal message conveyed by the media (Haworth-Hoepfner 2000). Peer relationships also amplify the effect of media: one study found a direct link between exposure to appearance-oriented magazines, appearance-oriented conversations with peers, appearance criticism from peers, and body dissatisfaction (Jones et al. 2004).

Family and peer influences are also powerful predictors of body dissatisfaction independent of media influence. Family pressure to lose weight is a prominent predictor of negative body image (Ata et al. 2007). Families that emphasize a discourse on thinness, for example when the mother is dieting, create a home where weight is critical to identity and pressure to be thin is increased (Field et al. 2001). Within the home, females tend to receive more feedback on their appearance than males, and this feedback is considered predictive of negative body image (Schwartz et al. 1999). Other harmful home environments are those dominated by authoritative parents.

Regarding peer relationships, there is evidence that young women mirror their peers' perceptions of their bodies, be they harmful or healthy. One study found girls' perception of their peers' body dissatisfaction to be a significant predictor of their own body dissatisfaction and dieting awareness (Dohnt and Tiggemann 2006). In addition to influencing body perceptions, peers have been found to influence weight control behaviors as well: perceived pressure from peers is associated with greater eating disordered behaviors, especially dieting, as well as body dissatisfaction (Peterson, Paulson and Williams 2007). In the school context, overweight girls are more likely to try and lose weight if other girls are doing the same (Mueller et al. 2010). Heilman (1998) hypothesizes that as a response to peer pressure, young women develop a psychological

need for control; this need for control over their lives translates to control over their bodies, and weight control behaviors develop.

### *Using Weight Control Mechanisms in Response to Negative Body Image*

From 1972 to 1996, overall appearance dissatisfaction among women increased from 23% to 56% (Thompson et al. 1999:20). Multiple negative consequences can result from perceiving oneself to be overweight, regardless of actual weight. Among females, the perception of being overweight is associated with depression, somatic complaints, and decreased self-esteem (Xiaoja et al. 2001). But the most serious consequence of an internalized negative body image is the use of harmful and/or unnecessary weight control mechanisms. Weight control behaviors are typically measured by a series of questions in which the respondent reports whether they have engaged in a list of behaviors over the previous year (Eisenberg et al. 2005; Neumark-Sztainer 2006).

There is a connection between unhealthy weight control methods and the main sources of pressure to be thin—namely family, peers, and media. Children who perceive that their mother is frequently trying to lose weight are more likely to become constant dieters (Field et al. 2001). Other types of family pressure to lose weight are found to be prominent predictors of eating attitudes and behaviors (Ata et al. 2007). Eating disorders, or instances of pathological weight control, often occur in dysfunctional family environments (Archibald et al. 1999). Media exposure and the influence of peers' body dissatisfaction were found to be predictive of dieting in young girls (Dohnt and Tiggemann 2006). Also, reported efforts to look like figures in the media were predictive of becoming a constant dieter (Field et al. 2001). These three external pressures—family, peer, and media—are all communicators of the thin-ideal. Thin-ideal internalization and the resultant negative body image were found to predict the onset of binge

eating, bulimic symptoms, and compensatory behaviors, whereas actual body mass was not predictive. Experimental evidence suggests that a decrease in thin-ideal internalization decreases body dissatisfaction and bulimic symptoms (Stice and Agras 1998; Thompson and Stice 2001).

A variety of weight control methods may be used by individuals in an attempt to adjust their body size. These behaviors can range from healthy behaviors such as eating more fruits and vegetables to extremely harmful behaviors such as taking laxatives. In examining this outcome, I model the distinction between healthy and unhealthy weight control behaviors after Neumark-Sztainer et al.'s (2006) study of body dissatisfaction and health behaviors.

### *Summary*

According to thin-ideal internalization theory, individuals will be influenced by sociocultural pressures to be thin to the extent that they internalize those ideas and act upon them by engaging in behaviors to make their own bodies consistent with the ideal. Because the current ideal is so unrealistic, thin-ideal internalization naturally breeds negative body image and body misperception, or the belief that one is larger than is the reality. The primary conveyors of the thin-ideal are family, peers, and media. Young women are most susceptible to these influences during puberty, and the severity of their effect is dependent upon the consistency and force of the influences.

## RESEARCH QUESTIONS AND HYPOTHESES

In this analysis, I ask two primary questions: first, to what extent does adolescent girls' perception of their body size deviate from their actual body size? In other words, to what extent do they possess a body misperception? Second, given the presence of such a deviation, what is the likelihood that an individual will engage in weight control behaviors in the context of other personal factors, such as her relationships with family and friends?

I attempt to answer these questions by testing two hypotheses: first, I predict that a substantial number of high school females will demonstrate a body misperception by reporting a gap between their actual and perceived body size, and that that gap most frequently appears in the form of *perceived weight > actual weight*.

**H<sub>0</sub>: Perceived weight = Actual weight**

**H<sub>a</sub>: Perceived weight ≠ Actual weight**

Second, I predict that the gap between actual and perceived body size characterized by *perceived weight > actual weight* is positively associated with the use of weight control behaviors, both healthy and unhealthy.

**H(o): No association between gap and weight control behaviors**

**H(a): Association between gap and weight control behaviors**

## METHODS

Quantitative methodologies are used to examine these questions. I conduct an analysis of nationally representative survey data to establish connections between weight control, body misperception, and the previously discussed social influences—family, peers, and media.

### *Data*

I analyze data from the 2001-2002 Health Behavior in School-Age Children Survey (HBSC). This survey was conducted in collaboration with the World Health Organization and included thirty-five countries. The high school questionnaire contained 92 questions and explored students' experiences with nutrition, physical activity, violence, relationships, perceptions of school, alcohol and tobacco use, and the community. The United States data includes a sample of 14,817 children ages 10 to 17, and it is representative of middle and high school aged children in the United States. My analyses are based on a sample of 2,784 high

school girls in ninth and tenth grade. Table 1 illustrates the means and standard deviations for the outcome and explanatory variables described below.

*Outcome A: Healthy Weight Control Behaviors.* Respondents answered whether they had engaged in thirteen types of weight control in the previous year. Behaviors are separated into two outcome variables based on whether they are typically healthy or unhealthy methods of weight control. Two behaviors, “others” and “eat less,” were not included in the analysis because their ambiguity made it difficult to classify if they were a healthy or unhealthy method of weight control. I model the distinction between healthy and unhealthy weight control after Neumark-Sztainer et al.’s (2006) study of body satisfaction, wherein indicators such as exercising and eating more fruits and vegetables are classified as “healthy weight control behaviors,” and indicators such as fasting and smoking are considered “unhealthy weight control behaviors.” While these authors also made a distinction between “unhealthy” behaviors and “very unhealthy behaviors,” such as vomiting (Neumark-Sztainer et al. 2006), this analysis will combine those types of behaviors into one outcome measuring the total number of unhealthy weight control behaviors.

The first outcome variable in the analysis conveys the total number of healthy behaviors the respondent reported using to control her weight in the past twelve months. Seven potential healthy behaviors include: *exercise, eat fewer sweets, eat less fat, drink fewer soft drinks, eat more fruits/veggies, drink more water, and diet under professional supervision.* This outcome builds off previous conceptions of healthy weight control behaviors (Neumark-Sztainer et al. 2006).

*Outcome B: Unhealthy Weight Control Behaviors.* Respondents report whether or not they engaged in six unhealthy behaviors in the previous year: *skip meals, fast, restrict to one*

*food group, vomit, use pills, and smoke more.* This model is a consolidation of previous conceptions of unhealthy weight control behaviors (Eisenberg et al. 2005). Although prior research includes indicators of the use of diuretics, laxatives, and food substitutes, the 2002 HBSC survey did not contain these measures.

*Explanatory Variables: The Gap.* The gap between actual and perceived body size is determined by information from two sources. First, actual body size is based on a BMI score calculated from self-reported weight and height measures. From this score, each respondent falls into one of four BMI categories based on percentiles established by the Center for Disease Control, where 1 = Underweight, 2 = Healthy weight, 3 = At risk of overweight, and 4 = Overweight. Second, perceived body size is measured by the question: “Do you think your body is...?” Potential responses are similar to the CDC categories for BMI, and answers range on the following scale: 1 = Much too thin, 2 = A bit too thin, 3 = About the right size, 4 = A bit too fat and 5 = Much too fat. These two questions were compared to determine if the respondent possesses a gap between her actual and perceived body size. In order to make a more direct comparison, the perception answers of “Much too thin” and “A bit too thin” were combined and used as an equivalent to the BMI category for underweight.

I measure the unit distance between individuals’ actual and perceived body size. Responses were recoded as dummy variables based on whether the unit difference was positive, negative, or 0. A score of 0 signifies an accurate body perception: for example, the respondent answered 1: *I think my body is too thin* for the question about perceived body size, and the same individual scored a 1: *Underweight* for the BMI question. In other words, they perceive their body size in accordance with CDC standards. A positive gap score indicates an individual who perceives herself to be heavier than she actually is. For example, her BMI=2, healthy weight, but

she answered 3, a bit too fat, when asked what size she thinks her body is. Individuals with negative gap scores perceive themselves to be thinner than they actually are. For example, a respondent might have a BMI score of 3, at risk of overweight, but say that she perceives her body to be the right size (perception = 2).

This analysis is primarily concerned with those whose body perception exceeds their actual body size, or the positive gap group. I am testing the effect of body misperception on restrictive weight control behaviors, or behaviors intended to decrease one's body size; thus, this outcome is most relevant for individuals who might feel some need to lose weight, because they believe they are heavier than they actually are. However, the other individuals remain in the analysis to ensure that the sample is random and not restricted to a specific type of respondent.

*Pubertal Growth.* Pubertal growth is measured by reported age of first menstruation. Ages are grouped into three categories and coded as dummy variables. Every individual who reported having begun menstruation either began early (between age 7 and 11), at the normal time (age 12), or late, (between age 13 and 16). Age 12 was selected as the normal standard for beginning menstruation, because it is currently the average age of first menarche for girls in the United States (NWHIC, 2009). A fourth dummy variable identifies those individuals who have not yet begun menstruation.

*Media Use.* Two variables control for media use: *tv* and *computer*. Values for these measures are computed by averaging the respondents' reported average television and computer use on a weekday and a weekend day. Both *tv* and *computer* are measured on a scale from 0 to 7 and represent the average number of hours the respondent watches television or uses a computer during the day; a response of 7 represents "7 or more hours per day." Although these data are intended to control for the respondents' exposure to media images that convey the thin-ideal,



they are very limited. Total computer use does not differentiate between time spent doing homework on a computer and things more conducive to media intake, such as shopping or visiting social networking sites.

These media use indicators possess another limitation. Literature on the correlation between media use and body image often includes a measure of fashion magazine reading, an outlet frequently targeted as a primary communicator of the thin-ideal. Although this measure would be ideal, it was not included in the 2002 HBSC survey.

*Interpersonal Relationships.* I examine characteristics of the respondents' interpersonal relationships using several different measures. Relationships with each parent were measured initially by the question "How easy is it for you to talk to your [mother/father] about things that are bothering you?" Values range on a scale from 1 to 5, where 1=Very easy, 2=Easy, 3=Difficult, 4=Very difficult, and 5=Don't have or see this person. Respondents answered this question for stepparents as well; if they answered 5 for either parent question and had a response from 1 to 4 for the corresponding stepparent question, their answer for how easy it was to talk to their stepparent was substituted. After making the appropriate substitutions, I recoded the responses into dummy variables, such that for each parent, every respondent either reported that it was easy to talk to their father/mother, difficult to talk to their father/mother, or they do not have or see this person.

I also take into account three peer-related interpersonal measures, the first being ease of talking to a best friend. This variable is scaled in the same way as the parent questions, and the respondent reports how easy it is to talk to her best friend on a scale of 1 to 5. Once again, the possible responses were recoded as dummy variables, such that every respondent found it easy to talk to their best friend, difficult to talk to their best friend, or they do not have or see this person.

Two additional measures account for the number of close friends reported by the respondent. First, *Number of close male friends* reflects the total number of close male friends the respondent reported at the time of the survey. Responses range from 0 to 3, with 3 indicating “three or more.” A parallel measure captures the *number of close female friends* reported at the time of the survey.

*Physical Activity.* This analysis controls for level of physical activity. Respondents were asked: “Over a typical or usual week, on how many days are you physically active for a total of at least 60 minutes per day?” Responses range from 0 to 7 days.

*Family Structure.* A set of dummy variables controls for the respondents’ family structure: each observation is classified as either living in a two-parent family, a single-parent family, or in another type of family structure.

*Race and Ethnicity.* Race and ethnicity are controlled for in this analysis. For race, respondents fall into one of four categories coded as dummy variables. The five categories are white, black, Asian, and other, other being comprised of people who are multi-racial, Pacific Islander, or Native American. An additional ethnicity dummy variable controls for whether the individual is of Hispanic origin.

### *Estimation*

I analyze the data in STATA using several different statistical methods. I use descriptive statistics for comparative purposes and to identify any collinearity issues. I examine a crosstabulation between actual and perceived body size to determine if a gap (the key explanatory variable) exists and is a legitimate variable in the model. To examine how the sample varies according to this gap, I use ANOVA to examine differences across independent variables for respondents with the various gap types, comparing those with a score of 0 (correctly

perceiving their body size) to those with positive or negative scores (perceiving their bodies to be heavier or thinner than they actually are). Next, I use four Poisson regression models to test the relationship between the explanatory variables and two outcomes: healthy and unhealthy weight control behaviors used in the previous year. I employ Poisson regression because it is especially well suited for outcome variables representing a total count of some event, and both outcomes in this analysis are summed totals of the “event” of weight control behavior (Hoffmann 2004). Each of these regressions is conducted in two models: the nested model includes all but the key explanatory variable, the gap measures. These variables are then included to complete the full model.

Multiple imputation is used to estimate missing data in STATA. The purpose of multiple imputation is to create multiple imputed data sets for a data set with missing values based on variables that contain complete data. The multiple analyses are then combined to yield a set of results. The Imputation by Chained Equations is based on each conditional density of a variable given all other variables (Royston 2004). In general, multiple imputation techniques require that missing observations are missing at random.

Prior to imputation, I run the full and nested models with non-imputed data—I do this because software for post-estimation diagnostics with imputed data is not yet well-developed. Though results from these tests cannot be directly applied to the final data, they inform us as to any problems in the original data with things like influential observations and heteroschedasticity, which would alter the results of the regression models. Scatter plots of deviance and leverage values revealed a relatively small number of leverage points in each model: the full models for positive and negative weight control had eight and fifteen leverage points, respectively. Upon further investigation, it was determined that these extreme

observations are the result of random variation in the sample—they share few common characteristics and appear to be a factor of the data. Additional diagnostic tests (White’s and Breusch-Pagan’s) for homoscedasticity revealed that all models violated this assumption, but the problem was alleviated with the use of robust standard errors.

After the models were run with imputation, I examined Bayesian Information Criterion (BIC) to ensure that the final models were the best fit for the data. Because the final imputed data set is a combination of ten iterations, I examined the BIC for each of the iterations separately and averaged them together. Explanatory variables were added progressively to determine if they were the best fit for the data. Interestingly, slightly lower BIC values were found when the controls for race and family structure were omitted from the model—however, these controls are essential for a reliable examination of a nationally-representative sample. Thus, the final models include the race and family controls.

## RESULTS

### *Descriptive Information*

Table 1 provides the coding range, mean, and standard deviation for each variable in the full model, conveying important characteristics of the sample. A majority of the sample are from two-parent families (mean = 0.649) and are white (mean = 0.539). Regarding the outcome variables, positive and negative weight control behavior, the means for each indicate that girls in the sample report over four times more positive weight control behaviors than negative weight control behaviors (means = 4.025 and 0.976, respectively). Perceived body size deviates slightly from actual body size in the direction that this analysis focuses on (perceive body to be heavier than it is), on average (mean = 0.262). In contrast, about half of the sample (mean = 0.539) perceive their body size correctly, such that there is no gap between their actual body size and

their perception of their body size. The final type of gap, those who perceive themselves to be thinner than they actually are, make up approximately 20% of the sample (mean = 0.200).

About 8% of the sample (mean = 0.081) have not yet begun menstruation. Thirty-three percent began at age 12—these observations are classified as belonging to the normative puberty group because 12 is the average age of first menarche in the United States (NWHIC 2009).

Approximately 30% of the sample began menstruating earlier, between ages 7 and 11, while about 29% began later, between ages 13 and 16 (means = 0.296 and 0.293, respectively).

Respondents in this sample report being physically active about 3.7 days in a usual week, though this varies considerably across the sample (standard deviation = 2.218). They also report watching an average of 3.2 hours of television a day, but this also varies across the sample (standard deviation = 1.886). Adolescent girls in this sample report using a computer an average of 1.7 hours a day.

Descriptive information on parent relationships reveals some interesting patterns in the sample. A majority of girls reported that it was difficult to talk to their father (mean = 0.524). Another approximately 33% said it was easy to talk to their father, while about 14% do not have or see their father. For mothers, it was more common for respondents to say it was easy to talk to her (mean = 0.617), while 31.5% said it was difficult to talk to their mother, and 7% (mean = 0.068) do not have or see their mother. Comparing these results suggests that girls in the sample have an easier time talking to their mothers than their fathers.

Examining information on friend relationships reveals that the vast majority of girls find it easy to talk to their best friend (mean = 0.871). Only 6% find it difficult to talk to their best friend, and about 7% do not have or see their best friend (means = 0.057 and 0.071,

respectively). On average, girls in the sample report having more female friends (mean = 2.694) than male friends (mean = 2.453).

[TABLE 1 ABOUT HERE]

#### *Crosstabulation and ANOVA Results*

The discrepancy between actual and perceived body size is the key independent variable in this analysis. Table 2 expresses the prevalence of this discrepancy by examining a crosstabulation of actual body size (BMI) and perceived body size. The outlined diagonal boxes represent the percentage of observations where BMI and perceived body size match, or where there is no gap or discrepancy. Cells above the diagonal indicate positive gaps, or observations where the perceived body size is larger than the actual body size. Cells below the diagonal indicate negative gaps, or observations where the perceived body size is smaller than the actual body size; in other words, these are people who believe themselves to be thinner than they actually are. Focusing on the former group, those who believe they are heavier than they actually are, it is interesting to note that 60.95% ( $n = 540$ ) of the sample who reported “I think my body is a bit too fat” are actually a healthy weight, according to BMI standards. Thirty percent ( $n = 51$ ) of individuals who said “I think my body is much too fat” are also actually at a healthy weight. These figures convey the prevalence of body misperceptions in this population and support the examination of gap measures as key explanatory variables in this analysis.

[TABLE 2 ABOUT HERE]

Table 3 displays the ANOVA results for each variable in the model across the three types of gap between actual and perceived body size. Several of these results should be noted. First, girls who have not yet begun puberty are more likely to perceive their body size correctly (no gap) than to think they are thinner or heavier than they actually are, thereby possessing a

negative or positive gap. These results are statistically significant ( $p < 0.05$ ) and suggest that distorted views of one's body are most common after menarche. Similar results were found for physical activity, which was more strongly associated with correctly perceived body size than either type of distorted perception ( $p < 0.01$ ). These results indicate that individuals who are more physically active are less likely to possess a distorted view of their bodies.

Regarding weight control behaviors, both positive and negative behaviors were more strongly associated with those who believe themselves to be heavier than they actually are than either those who believe themselves to be thinner than they actually are or those who perceive their body size accurately ( $p < 0.001$ ). Given that these weight control behaviors are typically intended to decrease one's body size, it is understandable that they would be more strongly linked to the individuals in the sample who sense that they need to lose weight.

Additionally, ANOVA results indicate that ease of talking to mother is associated with correctly perceiving body size ( $p < 0.05$ ) while difficulty talking to mother is associated with believing oneself to be heavier than is true ( $p < 0.001$ ). These findings were similar for ease and difficulty of talking to father as well, though the effects were weaker and were not statistically significant. Number of male and female friends was also more associated with believing oneself to be heavier than is true (positive gap), although only female friends was statistically significant ( $p < 0.05$ ). Taken together, these findings indicate that the accuracy or inaccuracy of body size among adolescent girls may be connected to the nature of their interpersonal relationships.

[TABLE 3 ABOUT HERE]

#### *Factors Associated with Positive Weight Control*

Results of the Poisson regression analyses are displayed in Table 4. The first model for each outcome examines the effect of all explanatory variables on positive and negative weight control

behavior, omitting the gap measure of discrepancies between actual and perceived body size. The second model for each outcome looks once again at the effect of these explanatory variables on positive and negative weight control, this time including discrepancies between actual and perceived body size.

Considering positive weight control first, I find a strong relationship in the full model between the various distorted views of the body (gaps between actual and perceived body size) and positive weight control behaviors. Believing oneself to be heavier than is true (a positive gap) is associated with a 40.5% increase in the expected number of positive weight control behaviors, controlling for all other explanatory variables ( $p < 0.001$ ). Believing oneself to be thinner than is true (a negative gap) is associated with a decrease in these behaviors of about 23% ( $p < 0.05$ ). These findings suggest that though the behaviors of interest are typically considered healthy, they may be instigated by an inaccurate and distorted understanding of one's body size among this population of adolescent girls.

Examining the puberty variables, I find that there is a significant association between beginning puberty early and the expected number of positive weight control behaviors ( $p < 0.05$ ). After including controls for discrepancies between actual and perceived body size, this relationship remains significant and even increases slightly, such that beginning puberty early is associated with a 25.6% increase in the expected number of positive weight control behaviors. Conversely, those who have not yet begun puberty are less likely to engage in positive weight control—this remains true but loses significance in the second model. These findings are in accordance with previous research suggesting that the acquisition of body fat in puberty instigates and intensifies body consciousness and the belief that one needs to lose weight.



Across both models, physical activity is also related to positive weight control: a one day increase in the average number of days physically active is associated with an approximately 14% increase in the expected number of positive weight control behaviors over the previous year, controlling for all other variables in the full model ( $p < 0.001$ ). This may be an indication that exercise is the more common form of positive weight control behavior among adolescent girls. It is also possible that physical activity among adolescent girls increases levels of body consciousness conducive to positive weight control behavior, though I cannot determine causal direction in this relationship.

Considering the interpersonal relationship measures, I find a number of interesting results related to positive weight control behavior. Difficulty talking to mother or not having or seeing a father are all associated with decreases in positive weight control, though the effects are slightly diminished when discrepancies between actual and perceived body size are controlled for. This association is strongest for difficulty talking to mother—controlling for all other variables in the full model, difficulty talking to mother is associated with a 25% decrease in the expected number of positive weight control behaviors ( $p < 0.001$ ). Conversely, having more male and female friends is associated with increases in positive weight control behaviors. In the full model, each additional female friend reported is associated with a 13.3% increase in the expected number of positive weight control behaviors ( $p < 0.05$ ). As with difficulty talking to mother, that this effect is slightly diminished in the full model suggests that some of the effect of female peers and mothers on positive weight control is explained through distorted body size.

Additionally, and contrary to much of the literature on media use and body image, average number of hours spent watching television is actually negatively associated with positive weight control: in the full model, each one hour increase is associated with about a 9% decrease

in the expected number of positive weight control behaviors over the previous year, after controlling for the other explanatory variables ( $p < 0.001$ ). This result was also similar, although statistically insignificant, for time spent on the computer.

Examining the race and ethnicity controls, it appears that black girls are far less likely to engage in positive weight control than girls of other races: in the full model, being black is associated with a 33% decrease in the expected number of positive weight control behaviors ( $p < 0.001$ ). Being Hispanic or Asian is also positively associated with these behaviors while being of another race is negatively associated, however none of these relationships are statistically significant.

#### *Factors Associated with Negative Weight Control*

Considering the other outcome next, I find believing oneself to be heavier than is true to be strongly associated with negative weight control behavior in the previous year: statistically controlling for the other explanatory variables, possessing this distortion or gap is associated with an approximately 83% increase in the expected number of negative weight control behaviors in the previous year ( $p < .001$ ). Interestingly, the relationship was also positive between believing oneself to be thinner than is true and negative weight control behavior, though the effect is not statistically significant.

Additionally, as with positive weight control, beginning puberty early is associated with increased negative weight control, but beginning puberty later is associated with decreased negative weight control. This effect is largest for beginning puberty early: controlling for all variables in the full model, beginning puberty before age twelve is associated with a 17.9 % increase in the expected number of negative weight control behaviors ( $p < 0.01$ ). Though the relationship to positive weight control behavior is larger, it appears that when a girl begins

menstruation has significant effects on her propensity to engage in negative, unhealthy types of weight control.

Across both models, physical activity is associated with a decrease in negative weight control behaviors. The effect is slightly diminished in the second model, such that a one day increase in the average number of days physically active is associated in a 3% decrease in the expected number of negative weight control behaviors. That physical activity had the opposite effect on positive weight control suggests that adolescent girls who exercise are more likely to engage in positive, healthy weight control rather than unhealthy weight control.

Noteworthy findings involve the interpersonal relationship measures—excluding *do not have or see best friend*, all interpersonal measures yield statistically significant associations with negative weight control. Except for number of close female friends, all of these effects are positive and statistically significant. The strongest effects involve the mother variables: in the first model, difficulty talking to mother is associated with a 23.3% increase in the expected number of negative weight control behaviors ( $p < 0.001$ ). After controlling for distorted perceptions of body size, this effect decreases to 17.6% ( $p < 0.01$ ), suggesting that the effect of the mother relationship on negative weight control is partially mediated through how accurately the individual perceives her body. An even stronger effect is found between *Do not have or see mother*, which is associated with a 44.1% increase in the expected number of negative weight control behaviors in the full model ( $p < 0.01$ ). Similar results are found for the father relationship.

Interestingly, the respondents' number of close male friends is associated with a 13% increase in negative weight control behaviors ( $p < 0.001$ ) but number of close female friends is associated with a 9% decrease in total negative weight control ( $p < 0.05$ ) in the full model. It

appears that there is a differential gender effect for peers on negative weight control—the implications of this discrepancy are discussed in the concluding section.

Contrary to the examination of positive weight control, time on the computer was actually associated with an increase in negative weight control of about 5% ( $p < 0.01$ ). That time watching television was associated with decreased behaviors suggests that these two media outlets operate differently in relation to weight control behaviors among adolescent girls. The implications of this are also discussed in the conclusion.

Finally, results indicate a similar relationship to the previous outcome between being black and engaging in negative weight control behavior: in the full model, being black was associated with a 22% decrease in the expected number of negative weight control behaviors ( $p < 0.001$ ). Contrary to positive weight control, however, being Hispanic, Asian, or another race was also associated with decreases in negative weight control, though once again these results were not statistically significant.

[TABLE 4 ABOUT HERE]

#### *Common Characteristics of the Two Full Models*

Two common findings across the two models are worth noting. First, believing oneself to be heavier than is true (a positive gap) is positively associated with both types of weight control, though the effect is almost twice as strong for negative weight control. Second, the age at which the respondent begins puberty is consistently related to both types of weight control behavior. Beginning menstruation early is associated with increased weight control, and beginning later is associated with decreased weight control. Given that girls who begin menstruating later have less time to acquire pubertal body fat, it is likely that they experience less pressure to be thin than girls who begin pubertal growth earlier. Another effect common to the two models is found in

the race variable *Black*. Statistically controlling for the effects of the other explanatory variables, being black is negatively associated with both positive and negative weight control.

#### *Differences Between the Two Full Models*

The most practically significant differences between the models involve the interpersonal relationship variables—difficulty communicating with parents is associated with increased negative weight control behaviors and decreased positive weight control behaviors. A wide body of literature establishes the connection between parent relationships and negative body image. However, a connection between parent relationships and specifically negative weight control behaviors is worth exploring, especially as it relates to eating disorder research.

### DISCUSSION

These findings suggest that certain characteristics and experiences among adolescent girls might be more conducive to healthy or unhealthy weight control. A few common characteristics emerge: girls who begin puberty later are less likely to engage in either category of weight control. Puberty has been found to be a starting point for weight control, body awareness, and body anxiety (Brooks-Gunn and Warren 1988; Lee 1994; O’Dea and Abraham 1999; Paikoff and Brooks-Gunn 1994), and it might be that girls who begin this stage at a more mature age are better equipped to handle the psychological stress which it brings (Brumberg 1997; Paikoff and Brooks-Gunn 1991).

Results on the association with media intake are somewhat peculiar: for negative weight control, time on the computer has a positive association and time watching television has a negative association. Previous research finds a generally positive association between time with particular media outlets, such as television, computers, and fashion magazines, and negative body image (Anderson et al. 2001; Dohnt and Tiggemann 2006; Jones et al. 2004). Additionally,

watching more television and reading a wider variety of appearance-focused magazines has been connected to dieting awareness and weight dissatisfaction (Anderson et al., 2001). Though this study does not measure magazine reading, the findings suggest that the various media outlets may have different associations depending on the type of weight control examined. It appears that time on computers, for example, is associated with more negative than positive weight control. Because time on the computer today has a much greater social component than television watching, it may be that computers more strongly communicate the thin-ideal and thus result in greater negative weight control: blogs, websites, and social networking with friends could be providing greater opportunities for girls to become concerned about their weight and also to learn how to alter their bodies, possibly in unhealthy ways. Future research should delineate which types of weight control are occurring in relation to media exposure, as well as the varying influences different types of media may hold.

The findings on interpersonal relationships raise many questions about how different relationships in young girls' lives relate to their thinking about and acting on their bodies. One's number of close female friends and the number of close male friends is positively associated with healthy weight control, although only the former was significant—this is in line with literature suggesting that girls' perception of their peers' body dissatisfaction is a significant predictor of their own body dissatisfaction and dieting awareness (Dohnt and Tiggemann 2006). Close male friends are also positively related to negative weight control, but number of close female friends is negatively related. Previous work has connected perceived pressure from peers in general with dieting and body dissatisfaction (Peterson et al. 2007), but these findings suggest that the influences of male and female friends should be examined separately in the future. It is possible that among male friends, girls feel greater pressure to appear attractive, while among

female friends, they receive emotional support that eliminates the necessity they feel to engage in negative weight control—these are avenues that need to be explored.

Measures of family relationships also yielded some complicating findings. Increasingly difficult relationships with mom and dad are associated with unhealthy weight control and negatively associated with healthy weight control. How easily one can talk to these individuals has been connected to body perception (Archibald et al. 1999; Ata et al. 2007) but an association with specific types of behavior is not well known and should be explored. Although I cannot assert causal order, these data suggest that negative parent relationships may push girls more toward the unhealthy behaviors as a mechanism not only of weight control, but also emotional control. This is supported by eating disorder literature which suggests that young girls develop eating pathologies in response to environmental stressors, which could include conflict within the family (Vitousek and Orimoto 1993).

Interesting findings involving the relationship between race and weight control came out in this study. Overall, blacks were much less likely to engage in any type of weight control than non-blacks. Regardless of whether one examines healthy or unhealthy weight control, it appears that black girls experience much less pressure to be thin. This supports the argument that the thin-ideal is both socially constructed and reinforced, and that its meaning and importance for the individual changes with context (Stice 2001).

The most significant finding of this exploration is the strong relationship between a gap between actual and perceived body size and both types of weight control. This relationship was particularly strong for negative weight control. That the gap between actual and perceived body size is so strongly related to negative weight control raises serious questions about the “normal” tendency for women and girls in Western culture to internalize an ideal of thinness (Vitousek and

Orimoto 1993). Because the thin-ideal is so pervasive (Brumberg 1997; Thompson et al. 1999), perceiving oneself to be overweight and feeling dissatisfied seems almost inevitable.

The perception of being overweight is associated with depression, somatic complaints, and decreased self-esteem (Xiaojia et al. 2001), and pathways predicting bulimic pathology connect thin-ideal internalization with body dissatisfaction (Stice 2001; Stice 2002).

Theoretically, the thin-ideal is reinforced by pressure to be thin and pursued through dieting (Stice and Agras 1998), but in my study supervised dieting was categorized as healthy weight control. It was the more harmful behaviors, such as vomiting, taking pills, and smoking, which were more strongly associated with a gap between actual and perceived body size. Given the potentially dangerous nature of these behaviors, perhaps the assumption that most women and girls cling to an unrealistic standard of thinness should be taken more seriously.

### *Limitations*

First and most importantly, though I identify an association between body misperception and weight control behaviors, I cannot establish causality. The possibility remains that weight control behaviors are causing body misperceptions, harming interpersonal relationships, and so forth. Second, only high school aged females were sampled; although body misperceptions can manifest themselves in pre-adolescents, these findings cannot be generalized to girls not of high school age. However, recent meta-analyses argue that this group is under-sampled in the literature, even though adolescents are the most susceptible to body image pressure (Stice 2002). So while a high school only sample is limited in its generalizability, this may actually be considered a strength in terms of contributing to the literature. Lastly, all measures are self-reported and are therefore subject to the distortion, misinformation, and misunderstanding that can result when we rely on individuals' perceptions of their own experiences and feelings.



Despite limitations, this work is an important contribution to the ongoing discourse on the causes and consequences of negative body image among adolescent females. In accordance with recommendations from a meta-analytic review of the literature (Stice 2002), this study focuses on the weight control behaviors of the population most susceptible to body image pressure, adolescent girls. Research on the factors associated with negative body image, dieting awareness, weight control behaviors, and similar perceptions and experiences is extensive. But these findings contribute to our knowledge of factors that may be differentially associated with healthy versus unhealthy weight control; understanding which factors draw girls in a positive or harmful direction in terms of thinking about and acting upon their bodies reveals greater complexity in their experience and sheds light on what we can do to promote their healthy development.

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**Table 1. Means and Standard Deviations for Characteristics and Behaviors of High School Females (N=2,784)**

| Variable   | Coding Range   | Mean  | Standard Deviation |
|--|--|-------|--------------------|
| <i>Outcomes</i>  |  |       |                    |
| Positive weight control behaviors                      | 0-7: Total positive behaviors used to control weight in past 12 months | 4.025 | 1.891              |
| Negative weight control behaviors                      | 0-6: Total negative behaviors used to control weight in past 12 months | 0.976 | 1.206              |
| <i>Body-related Behaviors and Characteristics</i>      |  |       |                    |
| <i>Gap</i>   |  |       |                    |
| Perceive body to be thinner than it is                 | 1 = Yes 2 = No   | 0.200 | 0.400              |
| Perceive body accurately                               | 1 = Yes 2 = No   | 0.539 | 0.499              |
| Perceive body to be heavier than it is                 | 1 = Yes 2 = No   | 0.262 | 0.440              |
| <i>Puberty</i>   |  |       |                    |
| Have not begun menstruation                            | 1 = Yes 2 = No   | 0.081 | 0.272              |
| Early puberty—began menstruation between ages 7 and 11 | 1 = Yes 2 = No   | 0.296 | 0.457              |
| Normal puberty—began menstruation at age 12            | 1 = Yes 2 = No   | 0.330 | 0.470              |
| Late puberty—began menstruation between ages 13 and 16 | 1 = Yes 2 = No   | 0.293 | 0.455              |
| Physical activity                                      | 0-7: Average number of days physically active per week                 | 3.727 | 2.218              |
| <i>Media Use</i>                                       |  |       |                    |
| Hours of TV per day                                    | 0-7: Average hours of TV per day                                       | 3.222 | 1.886              |
| Hours of computer per day                              | 0-7: Average hours of computer use per day                             | 1.677 | 1.505              |
| <i>Interpersonal Relationships</i>                     |  |       |                    |
| Easy to talk to Father                                 | 1 = Yes 2 = No   | 0.332 | 0.471              |
| Difficult to talk to Father                            | 1 = Yes 2 = No   | 0.524 | 0.500              |
| Don't have or see Father                               | 1 = Yes 2 = No   | 0.144 | 0.352              |
| Easy to talk to Mother                                 | 1 = Yes 2 = No   | 0.617 | 0.486              |
| Difficult to talk to Mother                            | 1 = Yes 2 = No   | 0.315 | 0.464              |
| Don't have or see Mother                               | 1 = Yes 2 = No   | 0.068 | 0.252              |
| Easy to talk to best friend                            | 1 = Yes 2 = No   | 0.871 | 0.335              |
| Difficult to talk to best friend                       | 1 = Yes 2 = No   | 0.057 | 0.232              |
| Don't have or see best friend                          | 1 = Yes 2 = No   | 0.071 | 0.258              |
| Number close male friends                              | Number of close male friends, 0 to 3+                                  | 2.453 | 0.889              |
| Number close female friends                            | Number of close female friends, 0 to 3+                                | 2.694 | 0.664              |
| <i>Family Structure</i>                                |  |       |                    |
| Two-parent family                                      | 1=Yes 0= No  | 0.649 | 0.477              |
| Single-parent family                                   | 1=Yes 0= No  | 0.127 | 0.333              |
| Other family structure                                 | 1=Yes 0= No  | 0.224 | 0.417              |
| <i>Ethnicity</i>                                       |  |       |                    |
| Hispanic   | 1= Hispanic 0=non-Hispanic   | 0.212 | 0.409              |
| <i>Race</i>  |  |       |                    |
| White  | 1= White 0=non-White   | 0.539 | 0.499              |
| Black  | 1= Black 0=non-Black   | 0.218 | 0.413              |
| Asian  | 1= Asian 0=non-Asian   | 0.040 | 0.197              |
| Other  | 1= Other 0=not other race  | 0.203 | 0.402              |

Source: 2001-2002 Health Behaviors in School-Age Children (HBSC)

**Table 2. Crosstabulation of Actual Body Size and Perceived Body Size (N=2,560)<sup>a</sup>**

| <i>I think my body is...</i> |              |                      |               |              |
|------------------------------|--------------|----------------------|---------------|--------------|
| BMI                          | Too thin     | About the right size | A bit too fat | Much too fat |
| Underweight                  | 27 (10.67%)  | 30 (2.4%)            | 4 (<1%)       | 1 (<1%)      |
| Healthy weight               | 223 (88.14%) | 1053 (84.17%)        | 540 (60.95%)  | 51 (30%)     |
| At risk of overweight        | 2 (<1%)      | 139 (11.11%)         | 225 (25.40%)  | 44 (25.88%)  |
| Overweight                   | 1 (<1%)      | 29 (2.32%)           | 117 (13.21%)  | 74 (43.53%)  |
| Row Total                    | 253          | 1251                 | 886           | 170          |

<sup>a</sup> Outlined diagonal boxes indicate observations with a gap of 0, or those whose actual body size matches their perceived body size. Observations above the outlined boxes indicate a positive gap, or individuals whose perceived body size is larger than their actual body size. Observations below the outlined boxes indicate a negative gap, or individuals whose perceived body size is less than their actual body size.

Source: 2001-2002 Health Behaviors in School-Age Children (HBSC)



**Table 3. ANOVA Results on Total Weight Control Behaviors, Pubertal Growth, Physical Activity, Media Hours, Interpersonal Relationships, Family Structure and Ethnicity Race among Types of Gap**

|  | Negative Gap <sup>a</sup> |       |         | No Gap <sup>b</sup> |       |         | Positive Gap <sup>c</sup> |       |         | F        |
|--|---------------------------|-------|---------|---------------------|-------|---------|---------------------------|-------|---------|----------|
|  | N                         | Mean  | (SD)    | N                   | Mean  | (SD)    | N                         | Mean  | (SD)    |          |
| <b><i>Physical Characteristics and Behaviors</i></b> |                           |       |         |                     |       |         |                           |       |         |          |
| Positive weight control behaviors                    | 467                       | 3.563 | (2.078) | 1267                | 4.018 | (1.868) | 640                       | 4.409 | (1.695) | 27.83*** |
| Negative weight control behaviors                    | 468                       | 0.795 | (1.070) | 1264                | 0.780 | (1.057) | 635                       | 1.452 | (1.382) | 77.65*** |
| Early puberty (age 7-11)                             | 511                       | 0.299 | (0.458) | 1379                | 0.302 | (0.459) | 670                       | 0.307 | (0.462) | 0.05     |
| Normal puberty(age 12)                               | 511                       | 0.297 | (0.458) | 1379                | 0.340 | (0.474) | 670                       | 0.348 | (0.477) | 1.94     |
| Late puberty(age 13-16)                              | 511                       | 0.323 | (0.468) | 1379                | 0.289 | (0.454) | 670                       | 0.303 | (0.460) | 1.02     |
| Have not begun puberty                               | 511                       | 0.080 | (0.272) | 1379                | 0.689 | (0.253) | 670                       | 0.042 | (0.200) | 4.16*    |
| Physical activity                                    | 507                       | 3.521 | (2.225) | 1369                | 3.874 | (2.226) | 669                       | 3.695 | (2.182) | 5.07**   |
| <b><i>Media Use</i></b>                              |                           |       |         |                     |       |         |                           |       |         |          |
| Hours of TV per day                                  | 459                       | 1.679 | (1.517) | 1251                | 3.173 | (1.845) | 617                       | 2.954 | (1.813) | 16.39*** |
| Hours of computer per day                            | 484                       | 1.679 | (1.517) | 1322                | 1.636 | (1.457) | 651                       | 1.793 | (1.574) | 2.41     |
| <b><i>Father Relationship</i></b>                    |                           |       |         |                     |       |         |                           |       |         |          |
| Easy to talk to Father                               | 492                       | 0.311 | (0.463) | 1349                | 0.351 | (0.476) | 659                       | 0.349 | (0.477) | 1.38     |
| Difficult to talk to Father                          | 492                       | 0.549 | (0.499) | 1349                | 0.529 | (0.499) | 659                       | 0.566 | (0.496) | 1.25     |
| Don't have or see Father                             | 492                       | 0.228 | (0.420) | 1349                | 0.199 | (0.399) | 659                       | 0.170 | (0.376) | 3.00*    |
| <b><i>Mother Relationship</i></b>                    |                           |       |         |                     |       |         |                           |       |         |          |
| Easy to talk to Mother                               | 511                       | 0.622 | (0.485) | 1379                | 0.650 | (0.477) | 670                       | 0.591 | (0.492) | 3.39*    |
| Difficult to talk to Mother                          | 511                       | 0.319 | (0.467) | 1379                | 0.290 | (0.454) | 670                       | 0.378 | (0.485) | 8.00***  |
| Don't have or see Mother                             | 511                       | 0.059 | (0.235) | 1379                | 0.060 | (0.238) | 670                       | 0.031 | (0.174) | 4.05*    |
| <b><i>Friend Relationships</i></b>                   |                           |       |         |                     |       |         |                           |       |         |          |
| Easy to talk to Best Friend                          | 511                       | 0.869 | (0.338) | 1379                | 0.891 | (0.312) | 670                       | 0.906 | (0.292) | 2.04     |
| Difficult to talk to Best Friend                     | 511                       | 0.063 | (0.243) | 1379                | 0.054 | (0.225) | 670                       | 0.051 | (0.220) | 0.43     |

|                                  |     |       |         |      |       |         |     |       |         |          |
|----------------------------------|-----|-------|---------|------|-------|---------|-----|-------|---------|----------|
| Don't have or see Best Friend    | 511 | 0.068 | (0.253) | 1379 | 0.056 | (0.230) | 670 | 0.043 | (0.204) | 1.79     |
| Number of close male friends     | 488 | 2.414 | (0.911) | 1334 | 2.451 | (0.885) | 657 | 2.498 | (0.854) | 1.32     |
| Number of close female friends   | 493 | 2.647 | (0.693) | 1346 | 2.692 | (0.648) | 657 | 2.752 | (0.614) | 3.83*    |
| <b><i>Family Structure</i></b>   |     |       |         |      |       |         |     |       |         |          |
| Two-parent family                | 511 | 0.618 | (0.486) | 1379 | 0.640 | (0.480) | 670 | 0.652 | (0.477) | 0.73     |
| Single-parent family             | 511 | 0.135 | (0.342) | 1379 | 0.123 | (0.329) | 670 | 0.121 | (0.326) | 0.30     |
| Other family structure           | 511 | 0.247 | (0.431) | 1379 | 0.236 | (0.425) | 670 | 0.227 | (0.419) | 0.31     |
| <b><i>Ethnicity and Race</i></b> |     |       |         |      |       |         |     |       |         |          |
| Hispanic                         | 501 | 0.234 | (0.424) | 1364 | 0.196 | (0.397) | 663 | 0.178 | (0.383) | 2.82     |
| White                            | 511 | 0.350 | (0.478) | 1379 | 0.568 | (0.496) | 670 | 0.687 | (0.464) | 70.95*** |
| Black                            | 511 | 0.389 | (0.488) | 1379 | 0.207 | (0.405) | 670 | 0.099 | (0.298) | 77.68*** |
| Asian                            | 511 | 0.031 | (0.174) | 1379 | 0.041 | (0.199) | 670 | 0.049 | (0.217) | 1.18     |
| Other                            | 511 | 0.229 | (0.421) | 1379 | 0.184 | (0.388) | 670 | 0.166 | (0.372) | 3.97*    |

<sup>a</sup> Negative gap: Perceived body size < Actual body size

<sup>b</sup> No gap: Perceived body size = Actual body size

<sup>c</sup> Positive gap: Perceived body size > Actual body size

\*\*\* p<.001 \*\*p<.01 \*p<.05

Source: 2001-2002 Health Behaviors in School-Age Children (HBSC)

**Table 4. Incidence-Rate Ratios (IRR) of Poisson Regression of Positive and Negative Weight Control Behaviors by Actual/Perceived Body Size Discrepancy (Gap), Pubertal Growth, Physical Activity, Interpersonal Relationships, and Media Use (Imputed Data)**

| Explanatory Variables  | Outcome Variable              |          |                               |          |
|--|-------------------------------|----------|-------------------------------|----------|
|  | Positive Weight Control (IRR) |          | Negative Weight Control (IRR) |          |
|  | Model 1                       | Model 2  | Model 1                       | Model 2  |
| <i>Body-Related Behaviors and Characteristics</i>              |                               |          |                               |          |
| Early puberty  | 1.249*                        | 1.256*   | 1.175**                       | 1.179**  |
| Late puberty   | 0.844                         | 0.861    | 0.875*                        | 0.882*   |
| Have not begun puberty   | 0.718*                        | 0.743    | 1.060                         | 1.120    |
| Physical activity  | 1.137***                      | 1.137*** | 0.975*                        | 0.977*   |
| <i>Interpersonal Relationships</i>                             |                               |          |                               |          |
| Difficulty talking to Father                                   | 0.894                         | 0.900    | 1.116*                        | 1.123*   |
| Do not have or see Father                                      | 0.720*                        | 0.732*   | 1.201*                        | 1.230*   |
| Difficulty talking to Mother                                   | 0.772**                       | 0.750*** | 1.233***                      | 1.176**  |
| Do not have or see Mother                                      | 0.778                         | 0.795    | 1.369*                        | 1.441**  |
| Difficulty talking to Best Friend                              | 1.176                         | 1.186    | 1.235*                        | 1.235*   |
| Do not have or see Best Friend                                 | 1.171                         | 1.161    | 0.963                         | 0.964    |
| Number of close male friends                                   | 1.065                         | 1.060    | 1.134***                      | 1.127*** |
| Number of close female friends                                 | 1.136*                        | 1.133*   | 0.911*                        | 0.909*   |
| <i>Media Use</i>   |                               |          |                               |          |
| Computer   | 0.999                         | 0.998    | 1.052**                       | 1.047**  |
| TV   | 0.910***                      | 0.913*** | 0.982                         | 0.985    |
| <i>Controls</i>  |                               |          |                               |          |
| Single parent  | 0.983                         | 0.993    | 0.966                         | 0.973    |
| Other family structure   | 0.941                         | 0.949    | 0.905                         | 0.917    |
| Hispanic   | 1.132                         | 1.150    | 0.960                         | 0.969    |
| Black  | 0.592***                      | 0.670*** | 0.699***                      | 0.776*** |
| Asian  | 0.996                         | 1.003    | 0.781*                        | 0.789*   |
| Other  | 0.878                         | 0.924    | 0.846*                        | 0.885    |
| <i>Gap</i>   |                               |          |                               |          |
| Perceive body to be heavier than it actually is (Positive gap) |                               | 1.405*** |                               | 1.833*** |
| Perceive body to be thinner than it actually is (Negative gap) |                               | 0.773*   |                               | 1.063    |
| N  | 2473                          | 2473     | 2471                          | 2471     |

\*\*\* p<.001 \*\*p<.01 \*p<.05

Source: 2001-2002 Health Behaviors in School-Age Children (HBSC)