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Relationship of BMI and Weight Perception to Weight Controlling Behaviors in 9th-12th Graders in the United States

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Relationship of BMI and Weight Perception
to Weight Controlling Behaviors in 9th-12th graders in the United States

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College of Public Health: Health Behavior

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Biographical Sketch

Natalie Jones has a passion for seeing people make positive life transformations, which inspired her to get a Bachelor's Degree of Fine Arts in Exercise Science and psychology from Transylvania University in 2013. In 2015, Natalie earned her Master's in Public Health, with a focus in Health Behavior, from the University of Kentucky. Further studying the inseparable relationship between a person's physical, mental and social well-being has proven invaluable. Natalie has been a health and wellness advocate with years of experience as a Wellness Guide, Peer Health Educator, Graduate Research Assistant, Personal Trainer at Xcel: Sports Science and Fitness and at the Underground Fitness Center on UK's campus.

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Abstract

Research indicates that high school students constitute the largest portion of those participating in unhealthy weight control behaviors. There is, however, little research that indicates what this behavior is influenced from. This study investigated the relationship of Body Mass Index (BMI) and (discordant or concordant) weight perception to weight control behaviors among 9th-12th graders in the United States. Using data from the 2013 Youth Risk Behavior Surveillance System (YRBSS), over 40 states and 13,000 surveys completed. Multiple Chi-square tests were performed, examining the association between BMI and weight perception in relation to weight control behaviors. We then examined whether perception predicted weight control behaviors rather than actual BMI status.

Introduction

The use of weight control behaviors is a common phenomenon among adolescents that can have profound consequences, adversely impacting both the physical and mental health of young people. Recent statistics indicate that high school students constitute the largest portion of those affected by these health consequences of weight control behaviors. For example, adolescents who used diet pills, vomited, took laxatives, took diuretics, fasted, skipped meals or any other form of weight control for weight loss had high levels of depression and were more likely to develop suicidal behaviors into young adulthood.²¹ Four percent of middle school students have some form of disordered eating or have attempted to control their weight through dieting. That number rises to 6.6% for high school students.¹ Related to these trends, large portions of adolescents are unsatisfied with their weight and are trying to lose weight.¹ In addition to actual weight, perceived weight status is an important determinant of weight control behaviors. For healthy weight management it is essential that adolescent perceive their weight status accurately. Equally important is an awareness of healthy methods and behaviors to maintain ideal weight.

Weight perception has many different definitions but in general it reflects how one sees, thinks, feels, and acts toward their own body.⁸ All of these dimensions are interlinked in order to form the

attitudes concerning one's body. Thus, weight perception is generally defined in terms of these four dimensions: perceptual, cognitive, emotional, and behavioral.⁹ Perceptual dimensions include the picture of your body that you form in your mind or what you see when you look in the mirror. The cognitive dimension is the way one evaluates one's body in terms of both appearance and function – this is how one perceives one's attractiveness and strength. The emotional dimension includes feelings experienced in relation to the body's appearance and function. These emotions can be positive (such as pride) or negative (such as anxiety or disgust). The behavioral dimension includes actions taken that reflect one's positive or negative perceptions, thoughts, and feelings about one's body. In short, weight perception is multifaceted, with these attitudes being formed and transmitted throughout one's life and by the influence of others.

Weight perception can either be concordant or discordant to actual body mass index (BMI). A concordant weight perception is when someone has an accurate perception about one's body shape and size. Some individuals with a concordant weight perception may have a healthy body image of shape and size, as well as may have a positive self-evaluations in the four perception dimensions. However, an individual can have an accurate perception yet still be dissatisfied with their body. A discordant weight perception is when there is a discrepancy between the evaluation of his/her body and actual BMI. Again, this can include both positive and negative self-evaluations in the perceptual, cognitive, emotional, and behavioral dimensions.

Perceived weight does not always reflect actual weight status based on BMI. Although people tend to view weight perception issues as a female problem, that is a myth. While weight perception discrepancies may be more common among females, this does not mean that males are immune to these distorted perceptions. In fact, because of the misconception that weight perception issues are a female problem, males are less likely to seek out help. The most common weight perception issue for

men is body dysmorphia. This is when a person is dissatisfied due to being insufficiently lean or muscular. Behaviors associated with body dysmorphia can include weight control behaviors like substance abuse, as well as comparing oneself unfavorably to others, frequently checking one's appearance, or camouflaging one's appearance.

Disordered eating can include behaviors reflecting many, but not all, of the symptoms of eating disorders such as anorexia nervosa and bulimia nervosa. The terms "disordered eating" and "eating disorder" are often used synonymously, though they are very different and require separate definitions.² The term "eating disorder" indicates a clinically diagnosable disease and usually involves serious disturbances in eating behaviors that often require medical intervention, whereas the term "disordered eating" refers to a pattern of abnormal eating behaviors that may ultimately lead to an eating disorder.² Anorexia nervosa and bulimia nervosa are eating disorders, while disordered eating includes fasting or chronic restrained eating, unbalanced eating (e.g., restricting a major food group such as fats or carbohydrates), laxative and diuretic misuse, steroid and creatine use, and the use of diet pills.³ Any of these weight control behaviors can have a destructive impact upon a person's life, with evidence showing adolescents engaged in disordered eating have an elevated risk for suicidal thoughts and behavior.³

Weight perception and weight control behaviors, like disordered eating, can be hazardous for adolescents because of the significant physical changes in their bodies during puberty. Some of the major health risks associated with adolescents engaging in any weight control behavior include brain and nerve function impaired by altered levels of neurotransmitters.¹⁹ Compromising these functions can cause depression, anxiety, fatigue, poor sleep, dizziness, fainting, and impaired functioning. The heart can have disturbed functioning due to low or high blood pressure and fatigue. This can lead to fainting, irregular heartbeats, and potentially sudden death from cardiac arrest. Other health risks include:

immune function decreases as infections become more likely due to the lack of necessary vitamins and minerals; the female triad; and kidney failure from dehydration, which can lead to death.

Going through puberty can also amplify body concerns as appearance becomes a primary focus. As males go through puberty, characteristics such as height, speed, broadness, and strength become admired, which are reinforced in Western society. For females, puberty brings on changes of increased body fat percentage (breasts and hips enlarge as menstruation begins) which may enhance further body dissatisfaction.¹⁵ These changes in the body can have an impact on both body perception and adolescents' psychological health as he or she becomes accustomed to his or her new appearance.¹⁶ These pubescent changes combined with any weight controlling behaviors can lead to the development of serious physical health problems such as heart conditions or kidney failure.¹⁷

Body perception has significant influence on the risk for developing weight controlling behaviors. A discordant body perception can put people at a greater risk of engaging in dangerous health behaviors such as extreme weight control, diminished mental performance, low self-esteem, anxiety, depression, and suicide.²⁰ It is important for adolescents to have a realistic perception of their bodies and to value their appearance in order for healthy growth and development. Therefore, determining the association between weight perception accuracy, BMI, and weight controlling behaviors is warranted.

This study is unique because it explored how weight perception could result in the onset of weight control behaviors. While previously mentioned research focused on actual weight status; discrepancy of self-evaluations and weight status; health risks; exercise performance; and food related determinants of disordered eating. Using updated data from 2013 YRBS makes this research extremely relevant for public health practitioners looking to implement interventions from our findings. The objective of this study is to evaluate the frequency of weight control behaviors in students from grades

9–12 and the relationship between weight control behaviors and having a weight perception that is either discordant or concordant with actual weight status based on Body Mass Index.

Methods

On November 25, 2014, the Institutional Review Board (IRB) reviewed our project and determined that the proposal does not meet the Department of Health and Human Services (DHHS) definition of human subjects and thus does not require IRB review. The IRB made this determination because our data is aggregated and cannot be linked to individual subjects and we the investigators would not be interacting/intervening with the subjects participating.

Participants

We analyzed the data from the Youth Risk Behavior Surveys (YRBS). The YRBS is a biennial survey that questions adolescents currently enrolled in school grades 9–12 in the United States. The YRBS screens for the top six hazardous health behaviors that could lead to disability and death among youth: violence, sexual behavior, alcohol/drug use, tobacco use, physical activity, and unhealthy dietary behaviors.

From the 2013 YRBS, we focused on the jurisdictions in which the results included measures about dietary eating, physical activity, and weight control. This sample was derived from 31 different states that measured and proctored the YRBS. Prior to administration of the YRBS, a parental permission/consent form was given. The YRBS is voluntary for the states, schools, and the students who participate. However, more than 13,000 United States high school students participated in the 2013 national YRBS. For the 2013 national YRBS, 13,633 questionnaires were completed in 148 public and private schools. The national data set was cleaned and edited for inconsistencies. Among the 13,633 completed questionnaires, 50 failed quality control because of missing questions and were excluded

from analysis, resulting in 13,583 usable questionnaires. The school response rate was 77%, while the student response rate was 88% for the year 2013. Overall, for the 2013 YRBS the response rate was 68% (YRBS, 2013).

Procedure

YRBS procedures are designed to protect student privacy, sanctioning anonymous participation rather than overtly recruiting subjects. Schools are selected with probability proportional to the size of student enrollment in the grades surveyed and the required classes of students. These classes are randomly selected to participate. While all students are eligible to participate, participation is voluntary.

Data is collected by those who volunteered to complete the YRBS during one allotted class period. Students record responses on a computer scan-able questionnaire booklet. On average, it takes about 35 minutes for students to record and complete their responses. However, it takes roughly 10 minutes for the survey administrator to distribute and read directions, bringing the total time of taking the YRBS to approximately 45 minutes.

The national YRBS sample is designed to produce estimates that are accurate within $\pm 5\%$ at a 95% confidence level. Since 1991, the national YRBS has been conducted 11 times with an average sample size of 14,517 and average school, student, and overall response rates of 78%, 86%, and 71%, respectively (YRBS).

Measures

As part of the survey packet distributed by the YRBS, participants self-reported on multiple subjects including disordered eating attitudes and behaviors. Three measures of disordered eating behaviors were used in the survey to assess physical activity, weight control, and dieting behaviors. The

next five questions were asked about body weight and perception and disordered eating. These are shown in Figure 1, below:

Figure 1: 2013 YRBS questions used in this study

Weight Perception and Disordered Eating
How do you describe your weight?
Are you trying to lose/gain/stay the same weight?
Did you not eat for 24 hours or more to lose weight/keep from gaining weight?
Did you take diet pills, powders, or liquids?
Have you vomited or taken laxatives to lose weight or to keep from gaining weight?

In order to measure concordant and discordant weight perceptions, four different variables were created. First, we created the BMI percentile variable from the height and weight of participants. We directly entered the BMI numbers and controlled for each BMI percentile range. The BMI percentile is used to screen for obesity, overweight, healthy weight, or underweight children and teens. Figure 2 identifies these BMI percentile ranges:

Figure 2: BMI Percentiles

Weight Status Category	Percentile Range
Underweight	Less than the 5 th percentile
Healthy Weight	5 th percentile to less than the 85 th percentile
Overweight	85 th percentile to less than the 95 th percentile
Obese	Equal to or greater than the 9 th percentile

Second, we created a composite variable that identifies discordant and concordant weight perception. This was calculated by using the BMI percentile range variable and the weight perception question from the YRBS of “How do you describe yourself?” as the variable of the participant’s weight perception. Controlling these predictors and outcomes allowed us to predict if a concordant or discordant weight perception was present. Third, in order to calculate the amount of students taking weight control actions we created a composite variable that identifies if a participant is engaging in any weight controlling behaviors. This regression model was done by combing all disordered eating variables into SPSS to calculate the total percentage. Fourth, we stratified question number 84 to compare weight perception and disordered eating among athletes and non- athletes. Question 84 asks; during the past 12 months, on how many sports teams did you play? (Count any teams run by your school or community groups.). Students could response options included zero teams, one team, two teams, and three or more teams. We combined all participants who had played on one, two, or three sports teams in the past year as the athlete variable. Those who answered no to playing a sport in the past year were categorized as non-athletes.

Analytic Plan

This study examined the relationship of Body Mass Index (BMI) and (discordant or concordant) weight perception to weight control behaviors among 9th-12th graders in the YRBS. Multiple Chi-square tests were performed, examining the association between BMI and weight perception in relation to weight control behaviors. We then examined whether perception predicted weight control behaviors rather than actual BMI status. All statistical analyses were performed using SPSS software, version 22.

Results

Participants in the 2013 National YRBS were representative of the national high school population: about half of the participants were female (48.8%) and the other half were male (51.1%). More than half of the participants were White (54.8%), with Black/African American representing 27.6% of the students, and 25.6% Hispanic or Latino. More than half of students (66.3%) reported being in a healthy BMI percentile, 3.0% considered themselves to be underweight, 16.4% considered themselves overweight, and 14.2% considered themselves obese (Table 1).

With a majority of students being in the healthy BMI range, our analysis revealed that almost half (46.9%) of the students were engaged in weight controlling behaviors in order to lose weight. There is a significant difference in weight control behaviors by self-reported BMI (Chi Square =1695.399, $p < .001$). The effect size was large based on Cramer's $V = .367$. Overall, about half of students who were participating in weight control behaviors were in a healthy weight category (52%), and half were either overweight or obese (47%), as shown in Table 2.1.

In this sample, there is a significant difference in weight control behaviors by concordant and discordant weight perceptions (Cramer's $V = .286$, $p < .001$). Table 2.2 revealed whether or not a concordant or discordant weight perception influenced participant's weight control behaviors. This table shows that the majority of students who are participating in one or more weight control behavior has a discordant weight perception. That is, they have a distorted perception of their shape, or feelings of discomfort, shame, or anxiety towards their body. Sixty-nine percent of the students who have an underestimated discordant weight perception participated in a weight control behavior in the past 30 days. In this study, the majority of students (75.4%) who reported using one or more unhealthy weight control method had an overestimated discordant weight perception and 41% had a concordant weight perception.

Results of our analyses (Table 2.3) revealed that 64.3% of female participants engaged in one or more weight control behaviors in the past 30 days. The percentage of females, who have an underestimated discordant weight perception and have engaged in one or more weight control behaviors is 81.3%. Of females who have an overestimated discordant weight perception, 84.6% have engaged in any weight control behavior. Of female participants with a concordant weight perception, over half (55.4%) are engaging in at least one weight control behavior. Therefore, any discordant weight perception in high school females is significantly correlated with weight control behaviors (Cramer's $V = .270$, $p < .001$).

In Table 2.4, the results show that 38.0% of male participants engaged in any weight control behavior in the past 30 days. However, of those males engaging in any weight control behavior it was again the discordant weight perception variable that contributed to the significant relationship (Cramer's $V = .286$, $p < .001$) we found between the two variables. Of males with an underestimated discordant weight perception over half (61.8%) had participated in any weight control behavior in the past 30 days. More than half (56.1%) of the males who have an overestimated discordant weight perception also engaged in any weight control behavior. Of those with a concordant weight perception, only a quarter (27.2%) participated in any weight control behavior.

We reviewed how weight control behaviors may be influenced by grade level of high school students (Table 2.7). Our analysis revealed no significant relationship (Cramer's $V = .017$, $p = .421$) between the distribution of weight controlling behaviors in the past 30 days and grade level. However, we can see a steady occurrence of weight controlling behaviors present among all four grades (9th, 10th, 11th, and 12th). As entering freshman, 26.6% of the 9th grade students are already participating in weight controlling behaviors. Therefore, weight perception is an issue that needs to be addressed early in order to prevent the negative changes of an adolescent partaking in weight control behaviors.

In addition, we wanted to explore how being an athlete or non-athlete could influence one's weight perception and weight control behaviors. Of students who did not play on a sports team in the past 12 months, 47.9% (Table 2.6) participated in any weight control behavior. Of those 47.9% (3,149) who performed any weight control behavior, 77.5% had an overestimated discordant weight perception, 64.7% had an underestimated discordant weight perception, and 38.7% had a concordant weight perception. Of students who played on 1 or more sports teams in the past month (Table 2.5), over half (54.6%) engaged in any weight control behavior. Of those student athletes engaging in weight control behaviors, 74.5% had an underestimated discordant weight perception, 73.1% had an overestimated discordant weight perception, and 44.1% had a concordant weight perception.

Discussion

The purpose of this study was to investigate body weight perception and weight control practices among high school students in the United States. This study demonstrated that inaccurate weight perception leads to a significantly greater chance of engaging in a weight controlling behavior compared to those with an accurate perception. A large portion (69.0%) of students who engaged in disordered eating activities perceived themselves as thinner than they actually are compared to their BMI score. Those who perceived themselves to be bigger were equally as likely (75.4%) to engage in unhealthy weight loss methods for weight control. Of students who accurately perceived their weight, nearly half (41.2%) indicated participating in weight controlling behaviors. An important finding in our study is that the presence of inaccurate weight perception (underestimated or overestimated) among adolescents was associated with an increased frequency of weight controlling behaviors. Regardless of the type of inaccuracy, students of healthy weight could be at risk for developing unhealthy weight control methods. This study found that nearly one-half (46.9%) of a diverse sample of high school students in the United States are actively trying to lose weight. This is significant when the majority of

students (66.3%) are classified as having a healthy BMI. Unfortunately, BMI data for these students was calculated from self-reported height and weight instead of from biometric measures of height and weight.

In addition, we found that there is a difference between male and females when it comes to weight perception and any weight control behaviors. Of female participants, 64.3% have engaged in any form of weight control behaviors in the past 30 days. While still significant, the male participants have a lower percentage (38.0%) of engagement in any weight control behavior.

Research suggests that exercise and sports teams could be included as an additional factor which contributes to the development of eating disorders.⁶ The results of this study showed that both underestimated and overestimated discordant weight perception among student athletes made a significant contribution to weight controlling variance. With 54.6% of student athletes participating in weight control behaviors and having higher discordant weight perceptions than non-athletes, indicates the important role of the athletic body image is underscored. With the coexistence of exercise in disordered eating, one might participate in more, extreme, drastic, or (participate in one, not all) dangerous levels of exercise to compensate for the consumption of food. Education for students, coaches, school employees and the general public is essential to stopping this increasing trend in illness. Early interventions with middle school students can decrease the progress of disordered weight control throughout one's life. Schools need to offer programs that reach a large number of students in order to promote appropriate weight perceptions and healthy eating behaviors.

Strengths of this study include using a large representative sample of the target population via the 2013 YRBS. Employing the YRBS limited the study since only a few questions are used in order to measure how respondents perceived their weight and any weight controlling behaviors. The YRBS is based on self-reported data for the participant's behaviors in the past 30 days. Drawbacks of self-

reported data include social desirability bias, recall bias, and students may just estimate. In regards to perception, participants were not given a reference image when reporting whether or not they were underweight, overweight, or a healthy weight. This influence of perception can be due to both external and internal factors. Therefore, confounding factors could have influenced participants' judgments of themselves based on a third variable such as personally desired size, the size of their peers, or some other standard.¹⁹

Study limitations include using BMI percentiles to categorize participants based on height, weight, age, and gender. BMI is not the most accurate measure of health since fat mass and muscle mass are indistinguishable from one another. Accurately categorizing participants could lead to misclassification bias due to BMI, perception, and self-reporting. Another limitation in the YRBS study design is that cross-sectional data does not provide evidence of causality. Consequently, the relationship accuracy between BMI, weight perception, and examined weight controlling behaviors in this study is uncertain.

It is clear that over half of the students in this nationally representative sample practice unhealthy weight control behaviors. This determinant is salient because nutritional and weight management habits are developed during adolescence. Disordered eating frequently starts at a young age and can spiral out of control developing into a full-blown mental illness.⁶ The development of eating disorders such as anorexia and bulimia nervosa is influenced by multiple factors in a person's life, including such elements as genetic, psychological, personality, sociocultural, and familial predispositions.

Disordered eating behavior can quickly lead to eating disorders. Regrettably, disordered eating patterns occur too frequently in our society, especially among youth. Although an increasing number of people are being diagnosed, not enough people receive assistance and treatment. Consequently,

individuals with eating disorders are often not diagnosed until they are suffering detrimental health effects. This study shows that there is a need to focus on early preventative health behavior for adolescents in the United States. It is our conviction that the more students know about eating disorders and disordered eating, the better equipped they will be to determine whether they, other students, family members, or friends have eating disorders. Educating the public about this illness is a key step in treating disordered eating.

This study demonstrated that almost half of high school students in the United States (46.9%) are actively trying to lose weight. Health educators must examine causes when over half (66.3%) of students reside in the healthy BMI category. Inaccuracy of weight perception can be considered a risk factor for weight controlling behaviors and could potentially serve as an indicator of eating disorder onset. There is a need for additional research focusing on the relationship between weight perceptions and weight controlling behaviors. In order to minimize the prevalence of unhealthy weight control behaviors, we must develop interventions and support systems aimed at promoting lifestyle changes as an alternative to students taking drastic measures to manage weight.

Unfortunately, there are many gaps in what we know and what needs to be addressed. Healthy weight students may represent a group that could commonly get missed in a screening or intervention program. Healthcare providers should not overlook healthy weight students just because they do not fit the classic profile of an underweight adolescent at risk. Eating disorder prevention programs should consider interventions for all students, not just the classic profile. Although such programs do exist, they are far from being mainstream. Organizations like Girls on the Run or The Girls Project focus on increasing self-esteem and body image. These programs work by incorporating fun-based curricula that creatively teach healthy life skills through active collaboration and mentoring relationships. Such information is not always available to all youth. In light of the high prevalence of body weight

misperception, parents, schools, and healthcare providers can collaborate to promote healthy body image perception and healthy eating.

The major finding of this study proved that one's perception of weight is a better predictor than actual weight status of whether or not adolescents will engage in weight control behaviors. Our analysis demonstrates that not only underweight but also normal and overweight adolescents would also benefit from screenings and early interventions. These perceptual issues also affect all grade levels equally, with a quarter of every grade level participating in weight control behaviors. Students may participate in unhealthy weight controlling behaviors to fit into the "ideal" body type due to increasing psychosocial pressures and consequences. High schools are an ideal setting to address these misperceptions and thereby influence social norms regarding body weight in order to prevent unhealthy weight controlling behaviors among students. Underweight, healthy, and overweight male and female adolescents would equally benefit from messages about healthy lifestyle changes. Interventions are needed to help address the problems that are tailored for targeting these different groups of adolescents. Future research should minimize these gaps by focusing on screening students for unhealthy weight control behaviors, as well as promoting lifestyle changes, interventions, and support systems.

Tables

Table 1. Demographics and characteristics of participants: weight perception impact on weight control behaviors study; 2013 Youth Risk Behavior Survey.

N= 13,481

Demographics	n (%)
Gender	
Female	6,582 (48.8)
Male	6,894 (51.1)
Race/ethnicity	
White	6,403 (54.8)
Black/African American	3,220 (27.6)
Hispanic or Latino	3,408 (25.6)
American Indian/Alaska Native	320 (2.7)
Native Hawaiian/Pacific Islander	256 (2.2)
Education	
9 th grade	3,588 (26.6)
10 th grade	3,152 (23.4)
11 th grade	3,184 (23.6)
12 th grade	3,557 (26.4)
Weight Control Behaviors (in past 30 Days)	
Trying to lose weight	6,207 (46.9)
Fasted	1771 (13.4)
Took Pills	676 (5.1)
Vomited	550 (4.2)
Mean BMI Percentages	
Underweight (<5 th)	382 (3.0)
Healthy (5 th to <85 th)	8,325 (66.3)
Overweight (85 th to <95 th)	2,059 (16.4)
Obese (\geq 95 th)	1,783 (14.2)

Table 2.1: Results of Bivariate Analyses: Percentage Distribution of Weight Control Behaviors by Categories of Body Mass Index

Categories of Body Mass Index (percentile), n= 12,579	Any Weight Control Behavior		X ² Value (p Value)	Cramer's V (p Value)
	None (n=6,249)	One or More (n=6,330)		
Underweight (<5 th)	5.2%	1.0%	1695.399 (< .001)	.367 (< .001)
Healthy (5 th to <85 th)	80.6%	52.2%		
Overweight (85 th to <95 th)	13.0%	23.4%		
Obese (≥95 th)	4.9%	23.4%		

Table 2.2: Results of Bivariate Analyses: Percentage Distribution Weight Control Behaviors by Concordant and Discordant Weight Perceptions

Weight Perception, n=12,394	Any Weight Control Behavior		X ² Value (p Value)	Cramer's V (p Value)
	None (n=6,064)	One or More (n=6,302)		
Discordant Weight Perception (Underestimated)	31.0%	69.0%	1011.447 (< .001)	.286 (< .001)
Concordant Weight Perception	58.8%	41.2%		
Discordant Weight Perception (Overestimated)	24.6%	75.4%		

Table 2.3: Results of Bivariate Analyses: Percentage Distribution Weight Control Behaviors by Female Participants Concordant and Discordant Weight Perceptions

Female Weight Perception, n=6,086	Any Weight Control Behavior		χ ² Value (p Value)	Cramer's V (p Value)
	None (n=2,173)	One or More (n=3,913)		
Discordant Weight Perception (Underestimated) n= 892	18.7%	81.3%	1012.027 (< .001)	.270 (< .001)
Concordant Weight Perception n= 4,136	44.6%	55.4%		
Discordant Weight Perception (Overestimated) n= 1,058	15.4%	84.6%		
Total n= 6,086	35.7%	64.3%		

Table 2.4: Results of Bivariate Analyses: Percentage Distribution Weight Control Behaviors by Male Participants Concordant and Discordant Weight Perceptions

	Any Weight Control Behavior		χ^2 Value (p Value)	Cramer's V (p Value)
	None (n=3,910)	One or More (n=2,398)		
Male Weight Perception, n=6,308				
Discordant Weight Perception (Underestimated) n= 1,536	38.2%	61.8%	1012.027 ($< .001$)	.286 ($< .001$)
Concordant Weight Perception n= 4,250	72.8%	27.2%		
Discordant Weight Perception (Overestimated) n= 522	43.9%	56.1%		
Total n= 6,308	62.0%	38.0%		

Table 2.5: Results of Bivariate Analyses: Percentage Distribution Weight Control Behaviors by Concordant and Discordant Weight Perceptions among Student Athletes

Played on 1+ sports teams past 12 months, n=5,618	Any Weight Control Behavior		χ ² Value (p Value)	Cramer's V (p Value)
	None (n=2,553)	One or More (n=3,065)		
Discordant Weight Perception (Underestimated) n= 1,108	25.5%	74.5%	1005.832 (< .001)	.287 (< .001)
Concordant Weight Perception n= 3,646	55.9%	44.1%		
Discordant Weight Perception (Overestimated) n= 864	26.9%	73.1%		
Total n= 5,618	45.4%	54.6%		

Table 2.6: Results of Bivariate Analyses: Percentage Distribution Weight Control Behaviors by Concordant and Discordant Weight Perceptions among Non-Student Athletes

Did not play on a Sports Team in past 12 months, n=6,579	Any Weight Control Behavior		χ^2 Value (p Value)	Cramer's V (p Value)
	None (n=3,430)	One or More (n=3,149)		
Discordant Weight Perception (Underestimated) n= 1,271	35.3%	64.7%	1005.832 ($< .001$)	.287 ($< .001$)
Concordant Weight Perception n= 4,609	61.3%	38.7%		
Discordant Weight Perception (Overestimated) n= 699	22.5%	77.5%		
Total n= 6,579	52.1%	47.9%		

Table 2.7: Results of Bivariate Analyses: Percentage Distribution of Weight Control Behaviors by Grade Level

Grade Level, n=13,504	Any Weight Control Behavior		χ^2 Value (p value)	Cramer's V (p value)
	None (n=6,714)	One or More (n=6,790)		
9 th Grade	26.5%	26.6%	3.890 (0.421)	.017 (0.421)
10 th Grade	23.4%	23.3%		
11 th Grade	23.2%	24.0%		
12 th Grade	26.7%	26.0%		

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