

FOOD ATTITUDES ACROSS ADOLESCENCE

By

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THESIS ABSTRACT

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This study investigated the relations between age and individuals' food attitudes; gender, weight status, and body satisfaction were explored as moderators. It was hypothesized that there would be an overall negative correlation between age and food attitudes with older participants having less healthy attitudes about food; this relation was expected to be stronger for girls than boys. Adolescents ($N = 1107$, $M_{age} = 15.58$ years) from a public high school completed self-report questionnaires assessing their age, gender, weight status, body satisfaction, and food attitudes. The results showed that older adolescents experienced greater pleasure from food, while adolescents' weight status predicted decreased pleasure from food and increased weight concerns. Further, the study's findings revealed that there was a smaller difference in weight concerns for younger versus older boys regardless of weight status, whereas there was a significantly greater difference in weight status for younger versus older girls, regardless of weight status. These results show that an adolescent's weight concerns are dependent not only on their weight status and age but also their gender. It is hoped that these findings lead to the creation of interventions to address food attitudes that may contribute to ameliorating the current obesity epidemic among adolescents.

Keywords: food attitudes, food choice, weight status, age, gender, body dissatisfaction

Food Attitudes Across Adolescence

Eating behaviors and their related health consequences are frequently discussed in today's public and scientific spheres. This is at least partially because more than one-third of adults in the United States are obese; 17% of U.S. children also fall into this diagnostic weight category (Ogden, Carroll, Kit, & Flegal, 2014). Further, obesity rates are projected to reach 51% by 2030 (Finkelstein et al., 2012), and adolescents who are overweight and obese have an 80% chance of becoming obese adults (Guo & Chumlea, 1999). To combat these rising rates of obesity, it is necessary to understand the eating attitudes and behaviors that contribute to obesity.

Although the adult obesity rate is quite alarming, the predictions concerning adolescents are disconcerting as well. Predictions concerning adolescents' obesity rates are especially troubling because negative eating habits adopted early in life tend to persist into adulthood leading overweight adolescents likely to remain overweight or obese throughout their lives (Levi, Chan, & Pence, 2006). This places them at risk for developing other chronic diseases, such as high blood pressure, coronary heart disease, and diabetes in adulthood (Dietz, 1998). Further, research indicates that the longer a person maintains unhealthy eating behaviors, the more difficult it will be for the individual to change these eating behaviors and adopt healthier habits (Hulme, 1992). Thus, the present study explored one factor that may be related to these unhealthy eating behaviors during adolescence: food attitudes.

Theoretical Framework

One of the major influences on eating behaviors that is in need of more research, particularly as it pertains to adolescents, is attitudes about food. An attitude, by

definition, is a psychological motivation expressed by evaluating a particular entity (e.g. food) with some degree of like-dislike positive-negative, or good-bad polarity (Eagly & Chaiken, 1993). Food attitudes have been defined in terms of the motivations to eat certain foods and the meaning that food has in an individual's life (Ogden, Lialopoulou, Antilliou, & Gough, 2012; Renner, Spoesser, Strohbach, & Schupp, 2012). From a theoretical perspective, the Theory of Planned Behavior indicates that attitudes are one of the major influences on behavior, in addition to subjective norms and behavioral intentions (Ajzen, 1988; Dennison & Shepherd, 1995). Usually, to change a person's behavior, an individual needs to change his or her attitudes towards that particular behavior. This theoretical model is utilized to explain paths to multiple health-related behaviors, such as quitting smoking and exercising (Norman, Conner, & Bell, 1999; Courneya, Friedenreich, Arthur, & Bobick, 1999), but also supports the present investigation evaluating the potential influences on adolescents' eating behaviors (McDermott et al., 2015).

Research conducted by Dennison and Shepherd (1995) extended the Theory of Planned Behavior to explain food choice among adolescents. Six hundred seventy-five adolescents (ages 11-12 years and 14-15 years) in schools across England completed a questionnaire assessing intentions to eat three common foods (chocolate/sweets, fruit, and chips) at lunchtime. Attitudes and subjective norms, two of the three influences on behavior in the Theory of Planned Behavior, were found to account for most of the variance in intentions to eat these three foods. This study did not assess the relation between behavioral intentions and eating behaviors that the adolescent participants typically engaged in. Despite this, these findings provide preliminary support for the use

of the Theory of Planned Behavior in explaining food choice. However, this study was limited to early adolescents, focused on three particular food items, and did not explore the relation between behavioral intention and behavior engagement (Dennison & Shepherd, 1995). The current research included a wider age range (early adolescence thru late adolescence) to have a greater representation of the adolescent developmental period and a broader assessment of food attitudes to generalize to food as a general entity, and not specific foods.

The Food Behavior Model, a model with a similar, yet more specific, framework than the Theory of Planned Behavior, offers an explanation for the relation between psychological constructs and food choice behavior (Shepherd & Raats, 1996). It suggests that attitudes are one of the most important factors that influence eating behaviors. Food selection and eating behavior, determinants of an individual's general health, are largely guided by attitudes about food (Lozano, Crites, & Aikman, 1999). Taken together this research suggests clear support for the idea that attitudes are a correlate of food-related behaviors (Shepherd & Raats, 2006).

Defining Food Attitudes

The scientific literature has described food attitudes in various ways by different researchers. Food attitudes may best be understood through the factors that comprise this psychological construct. A number of researchers have proposed factors that may be conceptualized as most vital in evaluating food attitudes. For example, Aikman, Min, and Graham (2006) proposed a five-factor model of food attitudes, including the following: positive affect (e.g., comforted), negative affect (e.g., guilty), abstract cognitive abilities (e.g., healthy), general sensory qualities (e.g., taste), and specific

sensory qualities (e.g., salty, greasy). These researchers utilized previous literature on general attitudes and food selection to determine the facets of food attitudes to include in their questionnaire. Unfortunately, this lengthy measure assessed attitudes towards six specific foods, limiting the generalizability of this study's findings (Aikman et al., 2006).

Rozin and colleagues (2003) similarly suggested a six-factor structure of food attitudes. Rozin's Food-Life Questionnaire (FLQ) examines attitudes pertaining to a broader range of foods than Aikman and colleagues' (2006) scale. The six factors they suggest comprise food attitudes included weight concern, diet-health orientation, diet-health link, disordered eating, food negativity/importance, and natural food preferences. Unfortunately, Rozin and colleagues' questionnaire is comprised of a large number of items and is worded in various response formats (e.g. true/false, Likert-type scales), which may prove difficult for younger adolescents to respond to reliably (Dennison et al., 1995). With this being said, both Aikman and colleagues' (2006) and Rozin and colleagues' (2003) questionnaires both included pleasure-, health-, and weight-related items, suggesting the importance of these three factors in assessing food attitudes.

Although overall food attitudes are an important construct to understand in relation to eating behavior, the factors that comprise overall food attitudes are also interesting to study because of their potentially unique influences on eating behavior. Some subscales, such as positive affect, negative affect, abstract cognitive qualities, and sensory qualities, may have a stronger impact on eating behavior, whereas others may not be as influential (Aikman, Min, & Graham, 2006). The strengths of the factors may depend on the age of the population of interest, their respective weight statuses, and overall body dissatisfaction. Because of previous literatures' findings, the relations

among these factors (ie. age, BMI, and body dissatisfaction) were explored in the present study (Shepherd & Raats, 1996; Renner et al., 2012; Garner & Wooley, 1991).

The four subscales that were the focus of this study were *food and pleasure*, *diet-health orientation*, *diet-health link*, and *weight concerns*. These four were primarily selected due to their reoccurrence in both Aikman and colleagues' five-factor model of food attitudes, as well as *The Food-Life Questionnaire* developed by Rozin and colleagues (Aikman et al., 2006; Rozin et al., 2003). *Food and pleasure* is an important motivator when it comes to eating. Individuals do not solely eat because of physical hunger. Rather, the desire to experience some pleasure or comfort during the eating experience is often a motivating factor to eat (Steptoe, Pollard, & Wardle, 1995).

Pleasurable aspects of eating such as the preferred palatability of certain foods are well known to be important factors in the food choices people make (Nestle et al., 1998). The *orientation* between *diet and health* represents an individual's concerns about diet and short-term health consequences, leading to behaviors such as the modification of food choice to reduce fat and salt intake, increase consumption of water, and an emphasis of food choice on nutrition and immediate health consequences (e.g. blood pressure, weight loss) (compared to taste and food quality; Rozin et al., 2003). One study revealed that 35% of participants who completed *The Food-Life Questionnaire* reported a food's nutritional content, associated with the *diet-health orientation*, being more important than the pleasure experienced when eating certain foods than when making their food choices (Rozin et al., 2003) The link between *diet* and *health* seems to be important when explaining general food attitudes (Sharp, Hutchinson, Prichard, & Wilson, 2013). Individuals' beliefs about the *diet-health link* often focus on long-term health effects of

diet such as diabetes, cancer, and heart disease (Rozin et al., 2003). Last, *weight concerns* examine individuals' food choices based on the impact the food will have on their weight. This often leads to increased anxiety and an obsession with healthy foods, reducing overall quality of life, and decreased pleasure derived from food (Rozin et al., 1999). These four subscales were examined as they relate to age, BMI and body dissatisfaction in the present study.

Age as a Potential Predictor of Food Attitudes

Because research indicates that food attitudes are associated with eating behavior, factors that potentially influence these attitudes are important aspects of the Food Behavioral Model to explore and understand. From the perspective of the Food Behavioral Model, age is related to behavior through cognitive or motivational variables, and one of these variables is attitudes (Shepherd et al., 1996). Thus, it can be concluded that age is one factor that may influence attitudes, and, consequentially, impact food choice behavior (Rappoport, Peters, Downey, McCann, & Huff-Corzine, 1993).

Previous research has lightly touched on the age-food attitude relationship (Olsen, 2003). A recent study investigating a possible connection between age and seafood consumption found that older adults were more willing to eat seafood; however, this relationship only existed when mediated by positive attitudes towards eating seafood (Olsen, 2003). This study showed an important relationship between age and food attitudes; however, it focused on a particular type of food, not food in a broader sense. Other research shows that older individuals tend to eat based on “long-term oriented” food attitudes such as health concerns. Further, they hold a stronger *diet-health link* than younger children and adolescents (Rozin et al., 1999). On the other hand, younger

adolescents are motivated to eat by pleasure and visually appealing foods, categorically represented by “short-term oriented” food attitudes (Renner et al., 2012). This observation may be due to the fact that younger individuals tend to have less money and time to spend cooking and eating healthy foods (Chambers, Lobb, Butler, & Traill, 2008). Therefore, health concerns may not be strongly considered when younger individuals make food choices. To gain a greater understanding of this relation, the current study explored whether age influences an adolescent’s food attitudes as they pertain to the *diet-health link*.

Weight Status as a Potential Moderator of Food Attitudes

Individuals’ weight status, both perceived and actual, is another factor that may be associated with their food attitudes. Some research suggests that those with greater weight statuses (typically assessed via body mass index; BMI) tend to eat because of negative affective cues such as stress, anxiety, and boredom, whereas individuals with lower weight statuses will primarily eat based on internal cues such as physical hunger and the pleasurable experiences of eating (Renner et al., 2012). The link between perceived weight status and food attitudes may be explained by an individual’s age and gender. Specifically, pre-pubertal girls begin to show a perceived-ideal weight status discrepancy that tends to increase as they age, whereas this pattern is not present for boys (Thompson, Rafiroiu, & Sargent, 2003; Vander Wal & Thelen, 2000). Body dissatisfaction and weight and shape concern intensify across adolescence for both genders, but the strengths of the associations between weight status and body dissatisfaction associations remain gender-specific (Calzo et al., 2012).

Gender as a Potential Moderator of Food Attitudes

When it comes to food attitudes and eating behaviors, research suggests that gender is also influential. For example, Beardsworth and colleagues (2002) found that women were significantly more likely to worry about food than men. Women were also more likely to make active attempts to reduce weight (e.g., restrict food intake) than men. These results are not surprising given societal pressure for women and men to look a certain way: Women feel the need to decrease their weight to appear skinny and petite, whereas men may attempt to gain weight (or at least muscle) to seem macho and more “manly” (Dennison & Shepherd, 1995). These findings are not only found among men and women but among younger boys and girls: Concerns about weight appear in girls as young as 5 years old, whereas young boys are unlikely to be concerned about their weight (Davison, Markey & Birch, 2000). This gender difference also reflects the extent to which body dissatisfaction may affect positive feelings towards food (e.g., food as a source of guilt versus a source of pleasure; Rozin et al., 2003). Women tend to eat more due to negative emotions such as stress and guilt, whereas men will eat based on positive emotions (e.g., pleasure). Therefore, the relationship between age and food attitudes may be moderated by gender; however, research has yet to investigate this possibility.

Previous research has provided preliminary support for the relationship between gender and the *diet-health link*. Specifically, females tend to endorse the relationship between diet and health more so than males (Rozin et al., 2003). Furthermore, women have greater diet-health concerns across both Western and Eastern cultures, suggesting gender differences across cultures (Rozin et al., 1999). Because women are traditionally responsible for selecting and preparing food for their families, they often make food

choices based on how certain foods will impact the health and wellbeing of their families (Rozin et al., 1999).

Gender, Weight Status, Body Dissatisfaction, and Food Attitudes

There also seems to be an interaction among an individual's actual weight status, gender, and body dissatisfaction. Older women with a higher BMI often report engaging in dietary restraint behaviors, such as caloric restriction (De Ridder, Adriaanse, Evers, & Verhoeven, 2014). In pre-pubertal girls and overweight/obese children, body dissatisfaction is generally higher than in boys and healthy weight children. This relationship tends to increase with age and peaks during early adolescence (Littleton & Ollendick, 2003). Adolescent girls have the greatest concern about body image when compared to other age groups (Ansari, Dibba, & Stock, 2014). Therefore, addressing food attitudes at a younger age and targeting interventions towards a specific gender may be more beneficial than creating treatments for broader age groups or both boys and girls.

Body dissatisfaction and weight preoccupation become more relevant as individuals' weight increases (Garner et al., 1991). As girls age, they tend to have greater body dissatisfaction and are less satisfied with their body image than boys of the same weight status (Demarest & Allen, 2000). Preadolescent boys are generally more satisfied with their bodies; however, as they get older, body dissatisfaction increases (McCabe, 2012). Therefore, as adolescents age, their gender may impact their level of body dissatisfaction.

It is apparent that more research needs to be conducted in order to understand the factors that influence individuals' food attitudes, and how food attitudes may differ at different points across adolescence. The previously described study used adult

participants (Olsen, 2003); however, it seems imperative that this area of research focuses on younger participants, such as adolescents. There is some evidence that during life transitions, attempted behavior change is most likely to be successful (Leermakers, Perri, Shigaki, & Fuller, 1999). Adolescence is a vulnerable time for the adoption of both healthy and unhealthy behaviors, such as the adoption of particular eating behaviors (Hulme, 1992).

Aims of Proposed Study

In light of the previous research reviewed above, the present study addressed potential relations between age, specifically the adolescent developmental period, and food attitudes and further examined possible moderators. This study was a cross-sectional design, and therefore, causal conclusions were not possible. However, given the dearth of research examining food attitudes among youth, it is expected that this research will make a valuable contribution to the literature. The following relations between the described variables, as well as moderating effects, were predicted:

Aim 1 and hypothesis 1. To explore whether there is a relation between age and overall food attitudes. It was expected that younger adolescents would have healthier food attitudes, whereas older adolescents will have less healthy food attitudes (Chambers et al., 2008). Overall food attitudes were explored as were the four separate subscales that comprise the food attitudes construct: *food and pleasure*, *diet-health orientation*, *diet-health link*, and *weight concerns*.

Aim 2 and hypotheses 2a, 2b, 2c. Weight status, body dissatisfaction, and gender were included in the study primarily as moderators, but were first examined as main predictors of food attitudes.

Aim/hypothesis 2a. To investigate a potential relation between weight status (operationalized as BMI) and overall food attitudes. It was expected that adolescents with lower BMIs would have healthier food attitudes, whereas adolescents with higher BMIs would have less healthy food attitudes. Overall food attitudes were explored as were the four separate subscales that compose the construct of food attitudes.

Aim/hypothesis 2b. To examine the potential relation between body dissatisfaction and overall food attitudes. It was expected that adolescents with higher body dissatisfaction would have less healthy food attitudes, whereas adolescents with lower body dissatisfaction would have healthier food attitudes. Overall food attitudes were explored as were the four separate subscales that compose the construct of food attitudes.

Aim/hypothesis 2c. To examine differences between gender and overall food attitudes. It was expected that adolescent girls would have less healthy food attitudes, whereas adolescent boys would have healthier food attitudes. Overall food attitudes were explored as were the four separate subscales that compose the construct of food attitudes.

Aim 3 and hypothesis 3. Finally, gender, BMI and body dissatisfaction were explored as possible moderators of the relationship between age and food attitudes. These analyses are primarily exploratory and hypotheses were not proposed for these analyses.

A better understanding of food attitudes across adolescence could provide researchers with information that may contribute to the creation of interventions that focus on changing individuals' food attitudes from negative to positive at this critical, transitional life period. This will hopefully influence adolescents' eating behaviors, and

consequentially, their weight and health status. An understanding of food attitudes may contribute to programs to prevent obesity, which may need to be tailored to meet the needs of different populations.

Methods

Participants

Participants for the study included 1,107 high school students between the ages of 13 and 18 years old ($Mean_{age} = 15.58 \text{ years}$), representing the three stages of adolescence: early ($n=267$), middle ($n=789$), and late adolescence ($n=51$). For those participants ($N_{gender} = 1104$) who identified as either male or female, an approximately even distribution of girls ($N_{girls}=558$, $Percentage_{girls}=50.4$) and boys' ($N_{boys}=546$, $Percentage_{boys}=49.3$) information was obtained. A majority of participants ($Percentage_{White/Caucasian}=68.4$) self-identified as "White/Caucasian," with the following ethnic breakdown of remaining participants: $Percentage_{Asian/Pacific Islander}=13.7$, $Percentage_{Black/African American}=10.7$, $Percentage_{Hispanic/Latino(a)}=3.7$, $Percentage_{Other}=1.9$, and $Percentage_{American Indian/Native American/Aleutian or Eskimo}=0.8$. Participants who identified with more than one ethnicity composed 9.5 percent of the total sample. These participants were recruited from health and physical education classes in a public high school in the Philadelphia Metropolitan region. All individuals at this school had an equal opportunity to participate in the study because health and physical education is a requirement for these students.

Measures

Age. Participant's age was measured using one self-report item: "As of today, how old are you (in years)?" Possible responses for this question ranged from 13 to 18,

as these are the minimum and maximum ages of participants that were included in the study.

Food attitudes. Participants' food attitudes were assessed using a revised version of the 21-item Food-Life Questionnaire Short-Form (Sharp et al., 2013). Four subscales with a total of 19 items were selected to measure the theoretical construct, *Food Attitudes*, for this study's purposes. The subscales chosen were the following: *weight concerns* (6 items), *diet-health orientation* (5 items), *diet-health link* (4 items), and *food and pleasure* (4 items). Each item was evaluated on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) (see Appendix A for actual items). Low values of *weight concern* would be associated with healthier food attitudes; healthier food attitudes would be associated with high values of *diet-health orientation*, of *diet-health link*, and of *food and pleasure*. The total score range for *weight concern* was from 6 to 42, from 5 to 35 for *diet-health orientation*, from 4 to 28 for *diet-health link*, and from 4 to 28 for *food and pleasure*. The scores for the individual items were summed, and then scores from the four subscales were summed to provide a composite score, ranging from 19 to 133. These four subscales of food attitudes were examined separately for all analyses, and the composite score was also examined. Cronbach's alphas for this sample were the following: 0.77 (composite scale), 0.82 (*weight concerns*), 0.61 (*diet-health orientation*), 0.77 (*diet-health link*), and 0.71 (*food and pleasure*).

Gender. Participants were asked to self-report their respective sex by circling male or female. The item will be stated as follows: "What is your gender?: Male or female."

Weight status. Participants' weight statuses were measured using Body Mass Index (BMI) (Fuchs, Eschenbeck, Krug, Schlaud, & Kohlmann, 2012). Parents of the participants were asked to report their child's height and weight when providing consent for their child to participate in the study. The head researcher was unable to manually measure the adolescents' height and weight due to lack of approval from the school districts' Board of Education. Once all data was collected, the head researcher calculated each participant's BMI ($BMI = weight(lbs) / [height(in)]^2 \times 703$).

Body dissatisfaction. Participants' dissatisfaction with their body and face was measured using Likert scale items: "How satisfied would you say you are with the way you currently look, overall?", "How satisfied would you say you are with the way your body looks?", and "How satisfied would you say you are with the way your face looks?". These items allowed for a gender-neutral assessment of body image that has been found to be effective in past research (Markey & Markey, 2010). Responses ranged from 1=not satisfied at all to 9=completely satisfied. The scores for the three items were summed to provide a composite score, ranging from 3 to 27, with lower scores indicating greater body dissatisfaction and higher scores indicating smaller body dissatisfaction. Cronbach's alpha for the composite score of this sample was 0.90.

Procedures

The study was conducted in a classroom setting under the supervision of the head researcher, research assistants, and the classroom teacher. Research assistants were present to aid in data collection and ensure that the ratio of participants to researchers was not greater than 7:1.

Because the research sample was comprised of individuals younger than 18 years of age, informed consent was obtained in two ways. First, a letter containing the informed consent document was given to the students to bring home to their parents. The parents were asked to read the informed consent, and if they agreed to allow their child to participate in the research study, the parents provided a written signature at the bottom of the document.

To secure assent of the participants, an age-appropriate assent document was provided at the beginning of the study's procedures. The head researcher slowly read the document's text aloud, and intermittently paused to ask the participants if they had any questions regarding the document. If no questions arose, the head researcher had the participants sign their name at the bottom of the document, in both block-lettering and cursive writing.

Researchers read the instructions, slowly and clearly, and asked what questions participants had regarding the instructions.. The participants were not required to answer all questions if they were unwilling and/or did not want to respond. The researchers instructed the participants to turn over their survey packet when they were finished completing the packet. The researchers reminded the participants that their involvement in the study was voluntary and they were allowed to withdraw at any point during the study. Participants did not receive compensation for their participation in the study.

The researchers provided relevant contact information, so the participants could contact the research team in case they thought of future questions and were not comfortable asking the questions in front of the other participants. Participants were assigned ID numbers so anonymity was maintained. The participants' surveys were

stored in a locked file cabinet in a locked lab that is only accessible to the head researcher and trained research assistants. This methodology was approved by the Institutional Review Board where the project was initiated.

Analytic Plan

In order to address the proposed hypotheses, correlational analyses, t-tests, simultaneous regressions, and tests of moderation (i.e., interactions in step-wise regression analyses) were conducted.

Correlations. Bivariate correlational analyses were conducted to see whether relations among the proposed variables exist (food attitudes [overall and the four subscales] and age, BMI, and body dissatisfaction), as well as the strength and direction of the bivariate relations.

T-Tests. Independent samples t-tests were conducted to determine whether differences exist between boys and girls for any facet of food attitudes.

Regressions and interactions. Once bivariate relations were examined, the unique contributions of the predictor variables (age, gender, BMI, and body dissatisfaction) in explaining the outcome variables, food attitudes (overall and the four subscales) were explored using step-wise regression analyses.

Analyses were conducted to explore the interactions between the main predictor variable, age, and the potentially moderating variables (BMI, gender, and body dissatisfaction) that were found to have a statistically significant relation to food attitudes [overall and the four subscales]). In order to compute interaction variables, the four-predictor variables (age, BMI, gender, and body dissatisfaction) were first centered. The centered predictor variables were then used to create interaction terms (e.g., gender*age).

The main effects and interactions were examined using step-wise regression analyses. These analyses enabled an exploration of whether gender, body dissatisfaction, and BMI, moderated the relationship between age and food attitudes (overall and the four subscales).

Results

Relation between Age and Food Attitudes

In order to address the first hypothesis, that age would be related to overall food attitudes and its four subscales (*food and pleasure*, *diet-health orientation*, *diet-health link*, and *weight concerns*), correlation analyses were conducted. Age was related to *diet-health orientation*, such that as age increased, the belief that diet has an impact on our short term health decreased. Additionally, age was related to *food and pleasure*; as age increased, the pleasure received from food increased, but this finding was not apparent for overall food attitudes, *diet-health link*, and *weight concerns* (See Table 1. Correlations Among All Variables Investigated).

Relation between Weight Status and Food Attitudes

To see whether weight status was related to overall food attitudes and its four subscales (*food and pleasure*, *diet-health orientation*, *diet-health link*, and *weight concerns*), correlation analyses were performed. These analyses revealed that weight status is associated with *weight concerns*, such that as individuals' weight status increased, their *weight concerns* increased. Furthermore, as weight status increased, individuals' pleasurable experiences with food and overall food attitudes decreased, but not *diet-health orientation* and *diet-health link* (See Table 1).

Relation between Body Dissatisfaction and Food Attitudes

The association between body dissatisfaction and overall food attitudes and its four subscales (*food and pleasure*, *diet-health orientation*, *diet-health link*, and *weight concerns*), was explored using correlational analyses. These analyses revealed significant relations between body dissatisfaction and all four subscales as well as overall food attitudes (See Table 1). As body dissatisfaction increased, *food and pleasure* and overall food attitudes decreased. Furthermore, as body dissatisfaction increased, *diet-health link*, *weight concerns*, and *diet-health orientation* increased.

Differences between Gender and Food Attitudes

To address hypothesis 2c, regarding the potential differences between gender and overall food attitudes (as well as its four subscales; *food and pleasure*, *diet-health orientation*, *diet-health link*, and *weight concerns*) independent samples t-tests were conducted. Gender differences were observed in *weight concerns* and *diet-health orientation*, but were not found in *food and pleasure*, *diet-health link*, and overall food attitudes (See Table 2. *Gender Differences Among Food Attitude Outcome Variables*). Specifically, girls ($M=21.45$, $SD=5.43$) endorsed greater beliefs in the association between diet and short-term health consequences $t(1005)=3.78$, $p<0.001$, $d=0.24$, than boys ($M = 20.17$, $SD = 5.27$). Additionally, girls ($M = 21.75$, $SD = 8.46$) had more *weight concerns*, $t(1009)=-8.82$, $p<0.001$, $d=0.56$, than boys ($M = 17.25$, $SD = 7.72$).

Unique Predictions of Age, Gender, Weight Status, and Body Dissatisfaction of Food Attitudes

Given the significant correlation analyses observed, regressions were calculated to determine if age, gender, weight status, and body dissatisfaction were uniquely predictive of overall food attitudes, *weight concerns*, *diet-health orientation*, *diet-health link*, and

food and pleasure. Statistical analyses revealed that body dissatisfaction uniquely predicted *weight concerns* and *food and pleasure*. Second, weight status was uniquely predictive of *weight concerns* and *food and pleasure*. Last, age only predicted the subscale *food and pleasure* (See Tables 3-7 for regression analyses results for all predictor and outcome variables).

Gender, Weight Status, and Body Dissatisfaction as Moderators of the Age-Food Attitudes Relationship

Next, analyses were conducted to examine whether gender, weight status, and body dissatisfaction moderated the relationship between age and overall food attitudes and its four subscales (*food and pleasure*, *diet-health orientation*, *diet-health link*, and *weight concerns*). This final hypothesis was exploratory and aimed to examine possible interactions between the independent variables in predicting overall food attitudes and its four subscales. An interaction between weight status and age was found in predicting *weight concerns* (See Tables 3-7 and Figure 1. *Mean Weight Concerns as a Function of Age and Weight Status*). To understand this significant interaction, I used Aiken and West's (1991) method of testing simple slopes for adolescent's age at relatively high and low weight statuses. For adolescents with a lower BMI, their age did not predict their weight concerns, $b=0.915$, $p=0.062$; however, when adolescents had a higher BMI, their age did predict greater weight concerns, $b=-2.110$, $p=0.014$. Thus, adolescents' weight concerns are most influenced when a relatively high BMI is coupled with a relatively young age.

Because previous research has indicated that weight concerns increase with age, especially for girls, two post-hoc step-wise regressions for girls and boys were conducted

to examine whether gender differences would alter the significance of the interaction between age and weight status in predicting weight concerns (Ansari et al., 2014; McCabe, 2012). A significant interaction effect between weight status and age in predicting *weight concerns* was found for girls only (See Table 8. *Multiple Regression Analysis Predicting Weight Concerns Separated by Gender*; Figure 2. *Mean Weight Concerns as a Function of Age and Weight Status for Girls*; Figure 3. *Mean Weight Concerns as a Function of Age and Weight Status for Boys*). Using Aiken and West's (1992) simple slopes test, analyses revealed that for adolescent girls with a lower BMI, their age did not predict their weight concerns, $b=1.320$, $p=0.122$; however, when adolescent girls had a higher BMI, age did predict greater weight concerns, $b=-3.808$, $p=0.003$. Utilizing Aiken and West's (1991) simple slopes test, analyses showed that for adolescent boys with a lower BMI, their age did not predict their weight concerns, $b_{LowerBMI}=0.257$, $p_{LowerBMI}=0.765$. Similarly, for adolescent boys with a higher BMI, their age also did not predict their weight concerns, $b_{HigherBMI}=-0.771$, $p_{HigherBMI}=0.543$.

Discussion

Understanding food attitudes across adolescence is important given the rising obesity rates and associated health consequences among this population (Guo & Chumlea, 1999; Dietz, 1999). This study first examined the relation between age and food attitudes (overall and the four subscales of food attitudes). Second, gender, BMI, and body dissatisfaction were explored as main effects on food attitudes (overall and the four food attitude subscales). Last, gender, BMI, and body dissatisfaction were investigated as moderators of the potential relations between age and food attitudes.

Inconsistent with our first hypothesis, age was not related to adolescents' overall food attitudes as well as the food attitude subscales *diet-health link* and *weight concerns*. With this being said, age was positively associated with the subscales *diet-health orientation* and *food and pleasure*. As adolescents get older, they may become more knowledgeable as to they receive increased pleasure from food. This finding is not consistent with the first hypothesis that as adolescents age, their overall food attitudes, including the four subscale constructs, change to become less healthy. Receiving increased pleasure from food represents a healthy relationship with food such that when eating, individuals are more likely to experience positive emotions (e.g. pleasure, happiness, joy) rather than negative emotions (e.g. guilt, shame) (Barthomeuf, Droit-Volet, and Rousset, 2009). It may be that, in general, older adolescents are more cognizant of their emotions in comparison to younger individuals (Gottman, Katz, & Hooven, 1997). Thus, when self-reporting their engagement with food, younger adolescents may be unaware of the various emotions they are experiencing when eating. Also, because older adolescents often have increased independence and less parental control over their eating behaviors (Cohen, 1980) and, thus, a greater ability to purchase highly palatable (i.e. highly pleasurable) foods than younger adolescents, they may have increased exposure to the types of foods that provide greater pleasure than the foods younger adolescents are exposed to.

The second aim of the study was to examine the potential associations among weight status, body dissatisfaction, gender, and food attitudes (overall and the four subscales). *Diet-health link* and *diet-health orientation* were not significantly associated with weight status. Overall food attitudes had a weak, negative association with weight

status; as individuals weight status increased, their overall food attitudes decreased. Furthermore, *food and pleasure* had a weak, negative association with weight status, such that as weight status increased, individuals' pleasurable experiences with food decreased. This finding is consistent with the second hypothesis and previous research, which has suggested that individuals with higher BMIs (i.e. higher weight status) often have less pleasurable food experiences, which is also associated with less healthy food attitudes (Renner et al., 2012).

Furthermore, results indicated that weight status was positively related to the subscale *weight concerns*. Specifically, as individuals' weight status increased, their *weight concerns* increased. These results are consistent with past literature suggesting a relationship between weight status and negative affect (Renner et al., 2012). As individuals' body weight increases and they subsequently enter into the overweight or obese categories, the associated health consequences with being overweight or obese may heighten weight concerns. Because increased food consumption is often associated with weight gains, enjoying and experiencing the pleasures of food may be less likely.

Consistent with previous literature and my second hypothesis, body dissatisfaction was associated with overall food attitudes, the subscales *weight concerns* and *food and pleasure*, however, not related to *diet-health orientation*, and *diet-health link*. Increases in body dissatisfaction were moderately predictive of increased *weight concerns*, suggesting that adolescents' unhappiness with their physical appearance may induce greater weight and shape concerns.

The second aim of the study was to examine gender differences among overall food attitudes and its four subscales; these analyses proved significant for *weight*

concerns and diet-health orientation. Consistent with past research (Killen et al, 1994; Rozin et al., 1999), female adolescents had greater weight concerns and reported a greater association between diet and long-term health than male adolescents. This finding supports previous researchers' examination of gender differences in weight concerns among adolescents (Demarest et al, 2000; Ansari et al, 2014; Davison et al., 2000). One possible explanation for this finding is that the beauty ideals that boys and girls experience are different, with these ideals being more rigid for girls and women, and more likely to lead to greater concerns about weight (Markey, 2010).

To explore potential moderators of the age-food attitude relationship, I conducted step-wise linear regression analyses. An interaction was found for age and weight status in predicting individuals' weight concerns. Specifically, being a younger adolescent with a higher BMI significantly predicted greater weight concerns, whereas age did not predict weight concerns for those adolescents with lower BMIs. This finding suggests that being at a higher weight status as a young adolescent negatively influences their level of weight concerns; however, being at a lower weight status appears to have no influence on an adolescent's weight concerns, regardless of their age. It may be that younger individuals feel greater social pressure to be thin and concerned with their physical appearance, which is partially influenced by their body weight. Further, the younger adolescents in this sample were most likely in the midst of puberty and experiencing the weight gain associated with puberty (Markey, 2010). This weight gain tends to be more pronounced for girls (and less socially desirable for girls) and may exacerbate weight concerns among adolescent girls more than boys.

Because both the current study and previous research have found gender differences in the influences of age and weight status in predicting weight concerns (Calzo et al., 2012), subsequent post-hoc step-wise regressions were analyzed for boys and girls separately to examine gender differences in the age and weight status interaction. These analyses revealed that age did not influence the level of weight concerns for adolescent girls with a lower BMI; however, being a younger age did significant predict greater weight concerns in adolescent girls with a higher BMI. Furthermore, adolescent boys' age did not significant interact with their weight status in predicting weight concerns. These results show that an adolescent's weight concerns are dependent not only on their weight status and age but also their gender. It appears that as boy age, their weight concerns are relatively stable, whereas, girls' weight concerns are dependent on both their weight status and their age. Future prevention research should evaluate the effectiveness of gender- and age-specific programs in reducing weight concerns within the adolescent population.

Limitations

Although this study is novel in its evaluation of the differences in food attitudes across adolescence, it has notable limitations. The cross-sectional methodology of the study does not allow us to infer possible developmental changes across adolescence. To empirically observe whether food attitudes change during this time period, a longitudinally designed study would need to be conducted. Also, while the range of participants' age spanned most of the adolescent period (e.g. 13-18 years), a significant proportion of participants (71% of the total sample) fell into mid-adolescence (Barrett, 1996). Participant's ethnicity was also unevenly distributed, with a majority of the

sample self-identifying as Non-Hispanic White (68.4%) and 31.6 percent identifying as an ethnic minority or multiple ethnicities. The disproportionate number of participants identifying as middle adolescents and Caucasian limit the generalizability of the study's findings to these populations; future research should aim to sample from a more diverse adolescent population with a larger age range.

Conclusions and Implications

Despite these sampling limitations, the large number of participants ($N=1107$) and the study's ability to address novel research questions among this age group contribute to an enhanced understanding of food attitudes during adolescence. Adolescence is a particularly vulnerable time period in which health behaviors, such as eating behaviors, are learned and tend to become habitual (Levi et al., 2006). If unhealthy eating behaviors become habits, the likelihood of negative health outcomes in adulthood (e.g. diabetes, hypertension, coronary heart disease) drastically increases (Dietz, 1998).

The increasing rates of obesity among adolescents make it critical to understand the factors that contribute to the adoption of negative health behaviors. In understanding the relations between specific aspects of food attitudes and eating behaviors, as theoretically framed by the Food Behavior Model (Shepherd & Raats, 1996), it is possible to conclude that weight concerns and pleasure from food are two aspects of food attitudes that differ across adolescence and may be amenable to change in an effort to improve eating behaviors and health outcomes among adolescents.

Because of the drastic increase in rates of pre-diabetic and diabetic adolescents (23% in 2008 versus 9% in 2000; May, Kuklina, & Yoon, 2012) and the associated negative health consequences (e.g. cardiovascular disease), understanding factors that

impact these rates, such as food attitudes, are of utmost importance. The development of gender and age-specific obesity prevention programs to increase pleasurable experiences with food and reduce weight concerns would potentially both combat the adoption of unhealthy eating behaviors and promote the acquisition of healthy behaviors, respectively. By addressing adolescents' food attitudes during the earlier stage of this vulnerable, yet malleable, developmental period, the long-term, negative health consequences associated with unhealthy eating behaviors (e.g. obesity, diabetes) have the potential to be greatly minimized, eventually resulting in lowered rates of obesity and increased positive health and well-being.

Appendix A

Food-Life Questionnaire Short-Form

Please put an "X" in the box that best describes you.

Subscales Key Weight Concern (WC) Diet-Health Orientation (DHO) Diet-Health Link (DHL) Food and Pleasure (FP) Natural Food Preferences (NFP)	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree nor Disagree	Somewhat Agree	Agree	Strongly Agree
1. I have fond memories of family food occasions (FP)							
2. I rarely think about the long-term effects of my diet on health (DHO)							
3. I am concerned about being overweight (WC)							
4. I feel guilty when I overeat (WC)							
5. Diet can have a big effect on heart disease (DHL)							
6. I eat low-fat food on a regular basis(R). (DHO)							
7. Diet can have a big effect on obesity (DHL)							
8. Taste is more important to me than nutrition (R) (DHO)							
9. I am a healthy eater (DHO)							
10. I am currently on a diet. (WC)							
11. I eat fast food on a regular basis (DHO)							
12. I consciously hold back at meal time, so as not to gain weight (WC)							
13. Diet can have a big effect on good health (DHL)							
14. Money spent on food is well spent (FP)							
15. Diet can have a big effect on cancer (DHL)							
16. Enjoying food is one of the most important things in my life (FP)							
17. I think about food in a positive way (FP)							
18. I think natural, organic foods are better for you than commercially grown foods (NFP)							
19. My thighs are too fat. (WC)							
20. I control my caloric intake (WC)							
21. I think natural, organic foods taste better than commercially grown/processed foods (NFP)							

Sharp, G., Hutchinson, A. D., Prichard, I., & Wilson, C. (2013). Validity and reliability of the Food-Life Questionnaire. Short form. *Appetite*, 70, 112-118.

Table 1

Correlations Among All Variables Investigated

	Mean	SD	1	2	3	4	5	6	7	8	9
1. Age	15.58	1.199									
2. Gender	0.490	0.500	0.063*								
3. BMI	21.938	3.745	0.167**	0.058							
4. Body Dissatisfaction	11.095	5.577	-0.032	-0.256**	0.224**						
5. Overall Food Attitudes	91.012	11.086	0.025	0.093**	-0.590**	-0.290**					
6. Weight Concerns	19.546	8.414	-0.018	-0.268**	0.320**	0.455**	-0.590**				
7. Diet-Health Orientation	20.83	5.389	-0.126**	-0.118**	-0.018	-0.020	0.290**	0.299**			
8. Diet-Health Link	21.151	4.736	0.066*	-0.096**	0.008	0.064*	0.456**	0.210*	0.277		
9. Food and Pleasure	20.544	4.463	0.115**	-0.037	-0.099**	-0.173**	0.539**	-0.166**	-0.065*	0.204**	

Note. $N=1008$ * $p<0.05$ ** $p<0.01$

Table 2

Gender Differences Among Food Attitude Outcome Variables

	Girls ^o		Boys ^o		<i>t statistic</i>	Cohen's <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Overall Food	91.89	44.37	94.04	44.74	-0.77	-0.048
Attitudes						
Food &	20.72	4.51	20.38	4.41	1.18	0.074
Pleasure						
Diet-Health	21.45	5.437	20.17	5.27	3.775	0.24
Orientation**						
Diet-Health	21.59	4.27	20.69	5.16	3.04	0.19
Link						
Weight	21.75	8.46	17.25	7.72	8.82**	0.56
Concerns**						

Note. *Ngirl*=517, *Nboy*=492

* $p < 0.05$

** $p < 0.01$

Table 3

Multiple Regression Analysis Predicting Overall Food Attitudes

	B	SEB	Beta	Partial <i>r</i>
Step 1: $R^2=0.006$				
Age (A)	-0.065	1.855	-0.002	-0.001
Gender (G)	1.390	3.22	0.015	0.014
BMI (B)	-0.617	0.638	-0.050	-0.032
Body Dissatisfaction (S)	-0.045	0.409	-0.005	-0.004
Step 2: Change $R^2=0.003$				
AxG	-1.455	2.737	-0.026	-0.018
AxB	-0.138	0.331	-0.014	-0.014
AxS	-0.227	0.270	-0.030	-0.028
GxB	0.657	0.893	0.036	0.024
GxS	-0.575	0.610	-0.045	-0.031
BxS	0.072	0.076	0.035	0.031

Note. $N=918$ * $p<0.05$ ** $p<0.01$

Table 4

Multiple Regression Analysis Predicting Weight Concerns

	B	SE B	Beta	Partial <i>r</i>
Step 1: $R^2=0.308$				
Age (A)	-0.476	0.277	-0.068	-0.057
Gender (G)**	-3.244	0.480	-0.195	-0.219
BMI (B)**	0.660	0.095	0.297	0.224
Body Dissatisfaction (S)**	0.643	0.061	0.422	0.330
Step 2: Change $R^2=0.014$				
AxG	0.467	0.408	0.046	0.038
AxB*	-0.105	0.049	-0.061	-0.071
AxS	-0.016	0.040	-0.012	-0.013
GxB	-0.120	0.133	-0.037	-0.030
GxS**	-0.245	0.091	-0.106	-0.089
BxS	-0.015	0.011	-0.040	-0.043

Note. N=918

* $p<0.05$ ** $p<0.01$

Table 5

Multiple Regression Analysis Predicting Food and Pleasure

	B	SE B	Beta	Partial <i>r</i>
Step 1: $R^2=0.068$				
Age (A)**	0.477	0.170	0.129	0.093
Gender (G)**	-0.793	0.294	-0.090	-0.089
BMI (B)*	-0.091	0.058	-0.078	-0.052
Body Dissatisfaction (S)**	-0.189	0.037	-0.234	-0.165
Step 2: Change				
$R^2=0.012$				
AxG	-0.007	0.250	-0.001	-0.001
AxB	0.016	0.030	0.018	0.018
AxS	0.015	0.025	0.021	0.020
GxB	0.046	0.082	0.027	0.019
GxS*	0.128	0.056	0.105	0.076
BxS	-0.012	0.007	-0.064	-0.060

Note. $N=918$ * $p<0.05$ ** $p<0.01$

Table 6

Multiple Regression Analysis Predicting Diet-Health Orientation

	B	SE B	Beta	Partial <i>r</i>
Step 1: $R^2=0.041$				
Age (A)	-0.681	0.152	-0.150	-0.148
Gender (G)	-1.324	0.367	-0.122	-0.119
BMI (B)	0.042	0.052	0.029	0.027
Body	-0.051	0.035	-0.051	-0.049
Dissatisfaction (S)				
Step 2: Change				
$R^2=0.007$				
AxG	-0.043	0.312	-0.005	-0.005
AxB	-0.033	0.038	-0.030	-0.029
AxS	0.046	0.031	0.053	0.049
GxB	-0.051	0.102	-0.018	-0.017
GxS	-0.003	0.070	-0.001	-0.001
BxS	0.001	0.009	0.004	0.004

Note. $N=916$ * $p<0.05$ ** $p<0.01$

Table 7

Multiple Regression Analysis Predicting Diet-Health Link

	B	SE B	Beta	Partial <i>r</i>
Step 1: $R^2=0.023$				
Age (A)	0.156	0.185	0.040	0.028
Gender (G)*	-0.787	0.321	-0.084	-0.097
BMI (B)	-0.079	0.064	-0.063	-0.041
Body Dissatisfaction (S)	0.057	0.041	0.066	0.046
Step 2: Change $R^2=0.007$				
AxG	0.211	0.273	0.037	0.026
AxB	-0.049	0.033	-0.050	-0.049
AxS	-0.013	0.027	-0.017	-0.016
GxB	0.098	0.089	0.054	0.037
GxS	-0.033	0.061	-0.025	-0.018
BxS	0.010	0.008	0.050	0.046

Note. $N=916$ * $p<0.05$ ** $p<0.01$

Table 8

Multiple Regression Analyses Predicting Weight Concerns Separated by Gender

	B		SE B		Beta		Partial <i>r</i>	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Step 1: $R^2_{girls}=0.152$ $R^2_{boys}=0.104$								
Age (A)	-0.650*	-0.144	0.304	0.294	0.393	-0.023	-0.098	-0.023
BMI (B)	0.877**	0.665**	0.096	0.094	-0.091	0.325	0.389	0.319
Step 2: Change $R^2_{girls}=0.011$ Change $R^2_{boys}=0.001$								
AxB	-0.178*	-0.039	0.070	0.076	-0.108	-0.023	-0.116	-0.025

Note. $N=918$ * $p<0.05$ ** $p<0.01$

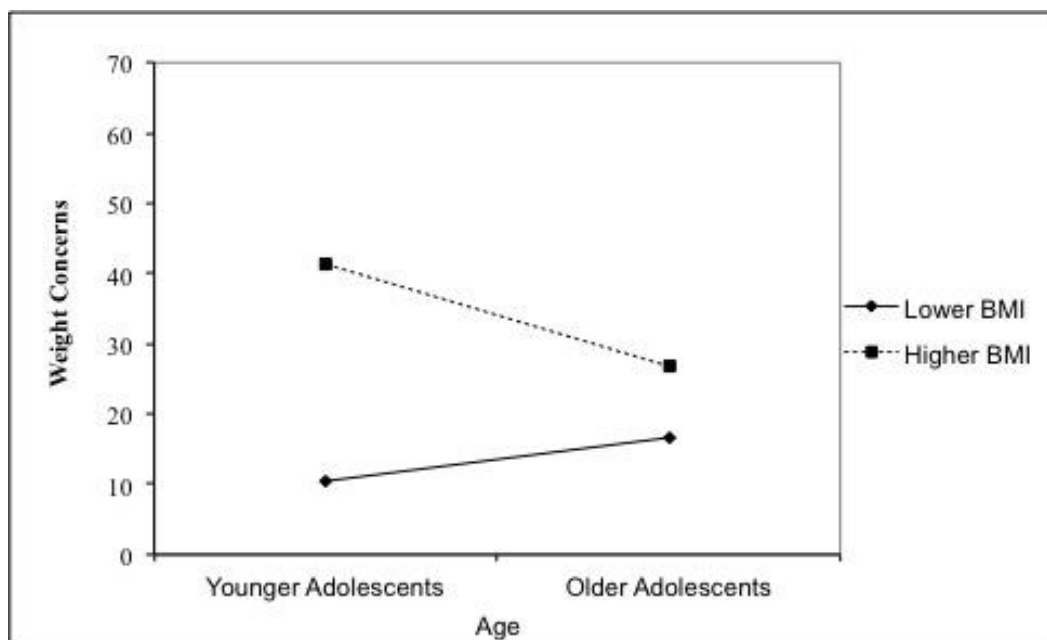


Figure 1. Mean Weight Concerns as a Function of Age and Weight Status

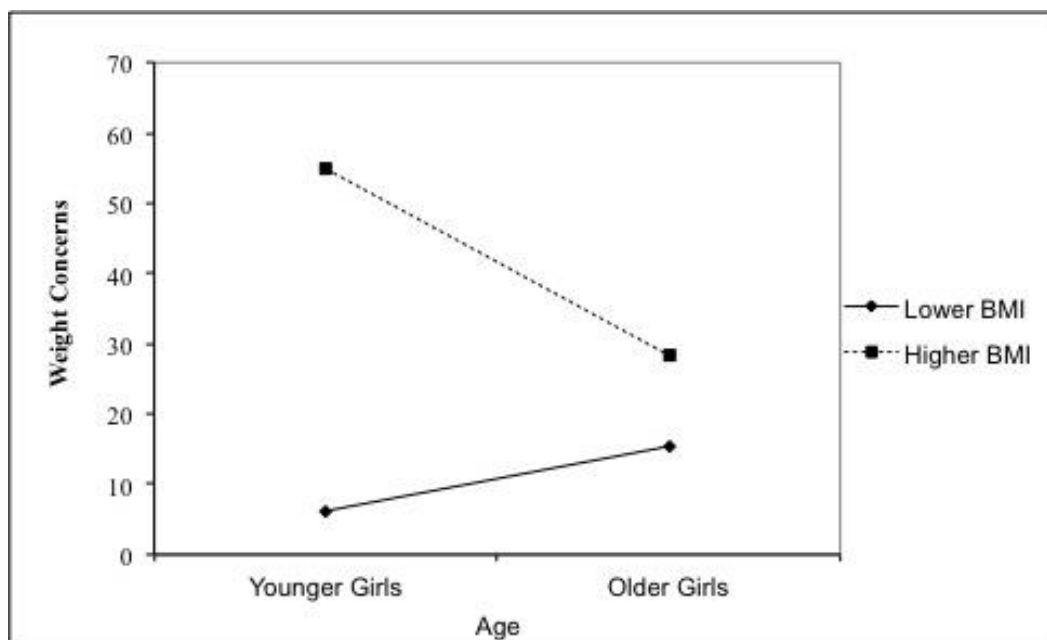


Figure 2. Mean Weight Concerns as a Function of Age and Weight Status for Girls.

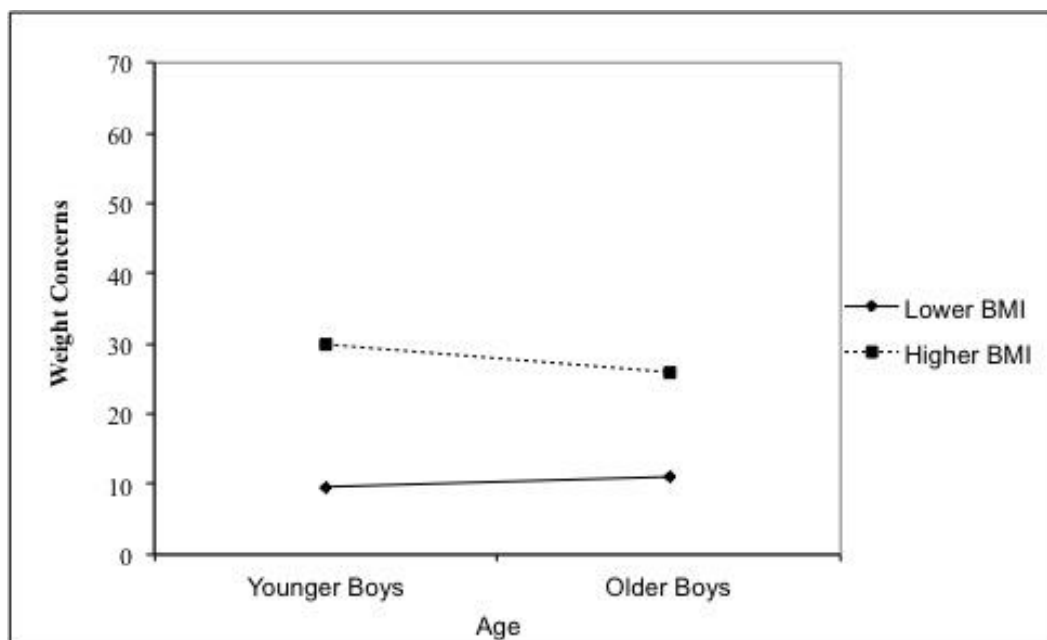


Figure 3. Mean Weight Concerns as a Function of Age and Weight Status for Boys.

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