

Peer Status and Victimization as Possible Reinforcements of Adolescent Girls' and Boys' Weight-Related Behaviors and Cognitions

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Objective Reciprocal longitudinal associations among weight-related behaviors and cognitions and peer relations constructs were examined among adolescent males and females. **Methods** Participants included 576 adolescents aged 10–14 years, in grades 6–8. Measures assessed body dissatisfaction, negative weight-related cognitions, weight management behaviors, muscle-gaining behaviors, body mass index (BMI), likeability, popularity, and victimization at two time points, approximately 11 months apart. Multiple group path analyses were conducted to examine the reciprocal longitudinal associations between the peer relations constructs and weight-related behaviors and cognitions, controlling for participants' Time 1 BMI, pubertal development, and age. **Results** Higher levels of body dissatisfaction were associated longitudinally with decreases in popularity. Higher popularity and lower likeability each were associated longitudinally with increases in negative body-related cognitions. Higher popularity was associated longitudinally with muscle-gaining behaviors for boys. **Conclusions** Findings suggest highly popular and disliked adolescents may be at greater risk of weight-related behaviors and cognitions than other adolescents.

Key words adolescents; peers; weight management.

Epidemiological data suggest that adolescents' body concerns and their engagement in potentially dangerous behaviors to modify their body shape are at alarming levels. Eating disorders currently are the third most common chronic illness in adolescent females (Croll, Neumark-Sztainer, Story, & Ireland, 2002). Recent statistics indicate that 45% of high school-aged students report actively attempting to lose weight, with 23% of these students using unhealthy weight-control strategies, such as fasting, vomiting, and taking laxative or diet pills (CDC, 2006). Even more alarming is that these unhealthy behaviors often occur in the absence of individuals' actual weight-related concerns, as ~24% of girls may be dieting despite not perceiving themselves as overweight (CDC, 2006).

Importantly, eating disorders and weight-related behaviors in adolescence may have life-course consequences. Even subclinical eating pathology can have lasting physical costs, such as amenorrhea, osteoporosis, cardiac arrest, electrolyte imbalance, as well as erosion of the teeth and throat (e.g., Fisher et al., 1995). The severity

of these consequences and the young age at which these weight-related behaviors are occurring underscore the importance of evaluating mechanisms that may reinforce and maintain these behaviors among adolescents.

Research has revealed at least three constructs relevant to understanding future risk of developing an eating disorder: body dissatisfaction, negative weight-related cognitions, and weight management behaviors (Stice, 2002). Body dissatisfaction is one of the strongest longitudinal predictors of adolescents' eating disordered behavior (e.g., Thomsson, Heinberg, Altabe, & Tantleff-Dunn, 1999). Negative weight-related cognitions refer to adolescents' sometimes irrational and pervasive thoughts regarding their bodies and weight (e.g., persistent concerns regarding the loss of 2 pounds, thinking constantly about one's body shape/build; e.g., Wang, Houshyar, & Prinstein, 2006). In addition, both health-promoting (e.g., nutrition-guided caloric restriction, mild exercise; e.g., Lattimore & Halford, 2003) and potentially dangerous (e.g., fasting, laxatives, excessive exercise; e.g., Story, Neumark-Sztainer, Sherwood, Stang, & Murray, 1998)

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weight management behaviors have been examined among adolescents. It has been suggested that compensatory behaviors, such as restricting or vomiting, may be preceded by weight-related cognitions (Powell & Thelen, 1996). In sum, these weight-related constructs (i.e., body dissatisfaction, negative weight-related cognitions, and weight management methods) are risk factors of developing later eating pathology, especially in adolescents (e.g., Patton, Selzer, Coffey, Carlin, & Wolfe, 1999).

The peer context may be particularly relevant to the adoption, reinforcement, and maintenance of these three types of adolescents' weight-related behaviors and cognitions (Jones, Vigfusdottir, & Lee, 2004). Youth spend increasing proportions of waking hours accompanied by peers (Larson, Richards, Moneta, Holmbeck, & Duckett, 1996), and discussions of eating/dieting, body shape, and weight-related behaviors are explicit and frequent (Jones & Crawford, 2006). Indeed, preliminary evidence suggests that adolescents who perceive peers to encourage dieting, perceive peers to place high levels of importance on weight-related issues, or receive weight-related feedback from a same-sex best friend are more likely to endorse body dissatisfaction and weight-related behaviors themselves (McCabe & Ricciardelli, 2003; Ricciardelli & McCabe, 2003; Thompson et al., 2007). In other words, adolescents who experience maladaptive weight-related cognitions and behaviors believe that these thoughts and behaviors may be supported by, or similar to, their peers. Thus, evidence suggests peers and adolescents likely mutually reinforce weight-related cognitions and behaviors within the peer context.

Unfortunately, much of this prior research is based on adolescents' *perceptions* of their peers' weight-related cognitions and behaviors, and most have examined only concurrent associations. Given the impact of the mere perception of friends' engagement in weight-related behaviors on adolescents' own behavior, it would be of great interest to determine whether there also is an association between *actual* peer reinforcements (i.e., peer-reported) and adolescents' weight-related behaviors and cognitions. Longitudinal research sorely is needed to determine whether such peer reinforcements may be associated prospectively with engagement in weight-related behavior. From a prevention perspective, this information would help to determine whether efforts should be directed toward modifying adolescents' (potentially distorted) perceptions, or whether actual reinforcements could be addressed more directly.

Within the developmental literature, two measures of status among peers have been identified, each of which may be relevant to understanding how peers might

reinforce weight-related cognitions and behaviors. Sociometric popularity (i.e., likeability) measures youths' preferences for one another (i.e., peer acceptance/rejection) and is based on peer nominations of those who are "liked most" or "liked least" (Coie & Dodge, 1983). Peer rejection is associated with a wide range of maladaptive outcomes, particularly in childhood (Parker & Asher, 1987). In contrast, peer-perceived popularity (i.e., popularity) is a reputation-based measure determined by peer nominations of others who are "most popular" or "least popular" (Parkhurst & Hopmeyer, 1998). Importantly, popularity emerges as a distinct construct from likeability at the transition to adolescence (Cillessen & Mayeux, 2004). Likeability and popularity are moderately correlated, but have been shown to be associated with several risk behaviors in opposite directions (e.g., Prinstein & Cillessen, 2003; Prinstein, Meade, & Cohen, 2003). For instance, aggression is associated with those who are disliked, but highly popular (Prinstein & Cillessen, 2003). Thus, one way the peer context may reinforce adolescents' engagement in risk behaviors, including weight-related cognitions and behaviors, is with higher levels of popularity, even if those adolescents engaging in risk behaviors simultaneously are not necessarily liked.

Another method through which peers may reinforce adolescents' behaviors is victimization. Indeed, a large body of research has suggested that victimization by peers and perceived teasing by peers related to body shape may be associated with weight-related behaviors and cognitions (e.g., Neumark-Sztainer et al., 2002). Perhaps not surprisingly, overweight youth perceive more victimization by peers than do their average-weight counterparts (e.g., Pearce, Boergers, & Prinstein, 2002), but peer victimization is not limited to overweight adolescents (Neumark-Sztainer et al., 2002). These findings suggest that peer status may not be the only means of conveying the significance of weight-related behaviors and cognitions, but that victimization may impact adolescents' adoption or maintenance of weight-related behaviors and cognitions as well.

Indeed, these two constructs of peer status (i.e., likeability and popularity) and peer victimization especially may be associated bidirectionally with the adoption, reinforcement, and maintenance of weight-related behaviors and cognitions. Developmental theory and research suggests that adolescents' regard for peers is associated with behaviors that are valued within the peer context (e.g., Juvonen & Galván, 2008). Adolescents who engage in behaviors that are consistent with peers' values are reinforced with high levels of status among peers and low victimization; adolescents who betray these values

are met with low status among peers and higher levels of peer victimization (Juvonen & Galván, 2008). If, as suggested by Stice (1998), adolescent peers subscribe to and value the “thinness norm,” it may be that engagement in weight-related behaviors and cognitions will be associated prospectively with increases in peer status and/or decreases in victimization over time (i.e., reinforcement of valued behaviors). Conversely, engagement in weight-related behaviors and cognitions that are not valued or are considered socially inappropriate may be associated with victimization or low status among peers. In addition, once high peer status or low victimization has been achieved, adolescents may continue to engage in or increase the behaviors that afforded them a desirable change of status in order to maintain their social position, even if the behaviors are risky. Thus, weight-related cognitions and behaviors may be associated reciprocally over time with peer status and victimization such that weight-related cognitions and behaviors maintain peer status and victimization levels, and peer constructs reinforce the adoption and maintainance of weight-related behaviors and cognitions.

We identified only three concurrent studies that examined associations between peer-reported constructs and weight-related cognitions and behaviors. Two of these only examined sociometric popularity (i.e., likeability) and yielded conflicting results. One study revealed that high levels of acceptance by peers were associated with *higher* levels of weight-related behaviors (Lieberman, Gauvin, Bukowski, & White, 2001), whereas the second study found that high levels of peer acceptance were associated with *lower* levels of weight-related behaviors (Graham, Eich, Kephart, & Peterson, 2000). These conflicting findings, however, may be due to differing measurements of weight-related behaviors and cognitions (questionnaire versus pictorial), multiple informants (i.e., adolescents versus adolescents and teachers), and different sample inclusion criteria (only menstruating adolescent females versus all adolescent females). The third study examined concurrent associations among both sociometrically derived likeability and popularity and weight-related behaviors and cognitions (Wang et al., 2006). These findings revealed that higher levels of popularity were associated with dieting behavior in adolescent boys and girls, as well as endorsement of “ideal” body shapes for adolescents’ boys and girls (i.e., more muscular for boys; thinner for girls). Given the mixed findings and concurrent research designs, more inquiry is needed to ascertain how likeability and popularity are associated reciprocally and longitudinally with weight-related behaviors and cognitions.

Historically, weight-related constructs have been studied among females. Recent work suggests, however, that males also may be attuned to appearance norms, especially with regard to muscular builds (e.g., Carfi, van de Berg, & Thompson, 2006). It is becoming increasingly clear that the distinction of weight concerns and muscularity concerns should be distinguished when examining weight-related constructs among adolescent boys (e.g., Ricciardelli & McCabe, 2004). Indeed, internalization of the muscularity norm among male youth has been associated with increases in body dissatisfaction (Jones, 2004), which has been found to be a significant predictor of dieting to gain weight (e.g., efforts to gain muscle; Carfi et al., 2006). In addition, research suggests that the peer context also may be relevant to adolescent boys’ muscularity concerns (e.g., Ricciardelli & McCabe, 2004). Although risk factors of muscle-related behaviors and cognitions may be similar to diet-related risk factors, it is clear that to accurately assess adolescent boys’ experiences with weight-related behaviors and attitudes, muscle-related behaviors and cognitions must be examined as a separate construct.

The study reported here examines the reciprocal longitudinal associations among four weight-related behaviors and cognitions (i.e., body dissatisfaction, negative weight-related cognitions, muscle-gaining behavior, and weight management behaviors), two constructs of peer status (i.e., likeability and popularity), and peer victimization. It was hypothesized that peer reinforcement of weight-related constructs could occur in two ways: adolescents’ engagement in weight-related constructs would be associated longitudinally with changes in peer status and victimization and levels of peer status and victimization would be associated longitudinally with changes in levels of weight-related constructs. To examine these associations stringently, the analyses controlled for adolescents’ age, pubertal development, and body mass index (BMI). All analyses were conducted among boys and girls and gender was examined as a moderator. Reciprocal, longitudinal associations between all primary constructs were examined.

Methods

Participants

Participants included 576 children and adolescents (50% female) in grades 6 (36%), 7 (30%), and 8 (34%) at the outset of the study. The ethnic composition of the sample included 84% White/Caucasian, 1% African American, 6% Asian American, 2% Latino American, and 6% of participants from mixed ethnic backgrounds (1% did not report

their ethnic background). Participants were aged 10 (1.2%), 11 (30.7%), 12 (28.8%), 13 (33.2%), and 14 years (6.1%) at Time 1. Participants were enrolled in public schools within a city of fairly homogeneous middle-class socioeconomic status in the Northeast. According to neighborhood and school records, average adult per capita income was approximately \$30,220, and 11% of children were eligible for free or reduced-price lunch.

Procedure

At Time 1, all sixth through eighth grade students were mailed and hand-distributed consent forms for study recruitment with strong encouragement and incentives for consent form return. Incentives included entry into a drawing for several small prizes (i.e., movie passes) and a grand prize (i.e., Sony Playstation 2), as well as individual incentives (i.e., a candy bar) for each student who returned a consent form (regardless of whether parents granted or denied consent). Teachers also received prorated financial incentives based on the proportion of their students who returned forms. Overall, consent forms were returned by 92% of families ($n = 784$); of these, 83% of parents gave consent for their child's participation, yielding a consented sample of 650 participants at Time 1 (77% of the total population). Youth provided assent at the start of the study. Students who were absent on one of the days of testing ($n = 10$), provided incomplete data on primary study constructs ($n = 10$), or refused to participate ($n = 4$) were excluded from analyses, yielding a final sample of 626 participants at Time 1. A total of 576 (92%) of these participants completed testing approximately 1 year later (i.e., Time 2), when students were in Grades 7–9. Attrition was due to participants' moving away from the area ($n = 36$), absenteeism ($n = 9$), and refusal to continue participation ($n = 5$). No significant differences were revealed for any of the study's constructs between adolescents who participated at both time points and adolescents who participated at only one time point. This final sample of 576 participants was used in all analyses of the associations among peer status, peer victimization, and adolescents' weight-related behaviors and cognitions.

Measures

Measures of weight-related behaviors and cognitions (i.e., body dissatisfaction, negative weight-related cognitions, muscle-gaining behaviors, and weight management behaviors), pubertal development, likeability, popularity, and victimization were administered at Time 1 and Time 2. Adolescents' height and weight statistics were collected

at Time 1 to calculate individuals' BMIs. Participants' dates of birth were used to calculate age at Time 1. All adolescents completed all measures listed below.

Body dissatisfaction. Girls completed the Ideal Body Subscale (IBS-Female; Cogan, Bhalla, Sefa-Dedeh, & Rothblum, 1996), consisting of 12 female silhouettes ranging in size from very thin to very obese. Using numbers corresponding to each silhouette, participants were instructed to indicate their perceived actual body size and their ideal body size. A discrepancy score was computed for each adolescent by subtracting reports of ideal body size from actual body size as an index of girls' body dissatisfaction. Higher discrepancy scores indicated girls' desire for a smaller body size. A total of 9.5% of girls at Times 1 and 2 indicated desiring a larger body size. Thus, to obtain a more pure and consistent index of body dissatisfaction, absolute values of these discrepancy scores were calculated and used as a measure of body dissatisfaction in all analyses.¹ Scores on this measure could range from 0 to 12.

Boys completed the IBS-Male (Cogan et al., 1996), consisting of a similar set of 12 silhouettes ranging from very thin, to muscular, to very obese males. Boys also indicated their perceived actual and ideal body size. Given that the silhouettes in the center of the scale depicted a more muscular build which in past research has been suggested to be the most societally desirable build for males (e.g., Leit, Pope, & Gray, 2001), boys were likely to report their actual size to be either higher or lower than the suggested ideal. A total of 20.2% of boys at Time 1 and 14.9% at Time 2 indicated desiring a larger body size. Thus, the absolute value of discrepancies between actual and ideal body size were computed to serve as an index of deviations from boys' ideal body size and general body dissatisfaction. As with girls, boys' higher

¹It was considered that the use of an absolute value score might make it difficult to determine whether findings were related to youths' desires to gain or to lose weight. Thus, separate analyses were conducted using a true difference score between ideal and actual body shape; the resulting directional score indicated youths' desire for a smaller body shape. We also reconducted analyses eliminating all youth who reported wanting a larger body size. Our results from these supplemental analyses suggested a similar pattern of results to the use of the absolute value score of body dissatisfaction. The use of a true difference (i.e., directional) score was somewhat misleading, however. This true difference score obscured the ability to detect males' dissatisfaction with a body shape they perceived to be too small. Thus, to retain a measure that was appropriate across gender, allowing us to examine gender moderation with greater accuracy, we retained the absolute value score of body dissatisfaction in the presentation of results.

discrepancy scores on this measure (possible range 0–12) indicated higher levels of body dissatisfaction.

Negative weight-related cognitions. Items reflecting the frequency of adolescents' thoughts and concerns about their body shape were used as a measure of weight-related cognitions. Using four items adapted from existing instruments (Cooper & Fairburn, 1987; Garner & Garfinkel, 1979), a brief checklist was created to examine the frequency of adolescents' negative cognitions about their body appearance and size related to obesity (e.g., "How often have you thought about having fat on your body?" "How often have you felt fat?" "How often have you thought about wanting to be thinner?" "How often have you worried about gaining 2 pounds?"). Adolescents responded using a 5-point Likert scale (1 = never; 5 = all the time; Wang et al., 2006) and a mean score across all four items was computed. This measure of negative weight-related cognitions showed good reliability at both time points for boys, Time 1: $\alpha = 0.84$ and Time 2: $\alpha = 0.87$, and girls, Time 1: $\alpha = 0.86$; Time 2: $\alpha = 0.89$.

Muscle-gaining behaviors. Three items adapted from the Youth Health Risk Behavior Survey (CDC, 2004) assessed muscle gain behaviors (e.g., "How many times in the past 30 days did you exercise or work-out to gain weight or to get more muscular?"). Adolescents reported the frequency of their engagement in each behavior over the past 30 days on a 5-point scale (i.e., 1 = 0 times; 2 = 1–3 times; 3 = once a week; 4 = a few times a week; 5 = everyday or almost everyday). A mean score was computed across items at each time point with acceptable reliability for boys, Time 1: $\alpha = 0.74$; Time 2: $\alpha = 0.74$. Reliability for girls was lower, Time 1: $\alpha = 0.54$; Time 2: $\alpha = 0.60$.

Weight management behaviors. Two items adapted from the Youth Health Risk Behavior Survey (CDC, 2004) were included to assess dieting behaviors used to manage weight or shape (e.g., "How many times in the past 30 days did you exercise or work-out to lose weight or to keep from gaining weight?" "How many times in the past 30 days did you eat less food, fewer calories, or foods low in fat to lose weight or to keep from gaining weight?"). Adolescents reported the frequency of their engagement in each behavior over the past 30 days on a 5-point scale (i.e., 1 = 0 times; 2 = 1–3 times; 3 = once a week; 4 = a few times a week; 5 = everyday or almost everyday). A mean score was computed across items at each time point. This measure of weight management behaviors showed acceptable reliability for boys, Time 1: $\alpha = 0.70$; Time 2: $\alpha = 0.69$ and girls, Time 1: $\alpha = 0.82$; Time 2: $\alpha = 0.73$.

Pubertal development. All participants completed the Pubertal Development Scale (Petersen, Crockett, Richards, & Boxer, 1988), which includes five items for boys (e.g., growth spurt, body hair, skin change, voice change, and facial hair) and girls (e.g., growth spurt, body hair, skin change, breast growth, and menarche) measuring gender-specific physical changes associated with maturation. Adolescents responded to each item using a 4-point Likert scale (1 = not started; 4 = seems completed). As in the past research (e.g., McBride, Paikoff, & Holmbeck, 2003), responses for girls' menarche were coded (1 = no; 4 = yes) to create a scale comparable to other items, and a mean score across all five items was computed for both girls ($\alpha = 0.75$) and boys ($\alpha = 0.79$), with higher scores indicating more advanced pubertal development.

Peer status. A sociometric peer nomination assessment was conducted to obtain measures of adolescents' sociometric popularity (i.e., acceptance/rejection—"likeability") and peer-perceived popularity (i.e., "popularity"; e.g., Parkhurst & Hopmeyer, 1998). Adolescents were organized into academic teams of approximately 60 students. Each participant was presented with an alphabetized roster of all academic teammates and was asked to select an unlimited number of peers for four sociometric items. The order of the alphabetized names on each roster was counterbalanced (e.g., Z through A) to control for possible effects of alphabetization on nominee selection. Adolescents' nominations of whom they "liked the most" and "liked the least" were used as a measure of likeability (i.e., peer acceptance and peer rejection). Adolescents' nominations of whom they considered "most popular" and "least popular" were used as a measure of peer-perceived popularity.

For each nomination item, the sum of the number of nominations each adolescent received was computed and standardized within the participants' academic team. A difference score between standardized "like most" and "like least" nominations was computed and restandardized ($M = 0$; $SD = 1$) for a measure of likeability, with higher (i.e., positive) scores indicating greater peer preference and lower (i.e., negative) scores indicating greater peer rejection (Coie & Dodge, 1983). Similarly, a difference score between standardized "most popular" and "least popular" nominations was computed and restandardized as a measure of each adolescent's peer-perceived popularity, with higher scores indicating higher levels of popularity. Sociometric assessments using these administration procedures yield the most reliable and valid indices of peer status (Coie & Dodge, 1983).

Peer victimization. Sociometric peer nominations also were conducted to obtain measures of adolescents' peer victimization. Adolescents' nominations of peers who "get threatened or hit by others, or has mean things said to them" and "get gossiped about or has rumors told about them behind their backs" were combined and used as a proxy for victimization. The total number of nominations each student received for each item was standardized ($M=0$; $SD=1$) within each grade, and then the two scores were averaged with higher scores indicating higher levels of victimization.

BMI. Adolescents reported their height and weight at Time 1. These data were collected before participants answered any questions associated with weight-related cognitions or behaviors. Research suggests a high correspondence between self-reported and objectively measured BMI; thus, these self-reported results are likely to be an accurate estimation of the current sample's weight status (e.g., Himes, Hannan, Wall, & Neumark-Sztainer, 2005). BMI percentiles based on age and gender were calculated as recommended by the CDC and used to determine the proportion of participants who were underweight (less than the 5th BMI percentile based on age and gender), healthy (between the 5th and 85th percentiles), overweight (between the 85th and 95th percentiles), and obese (greater than the 95th percentile; Mei, Grummer-Strawn, Pietrobelli, Goulding, Goran, & Dietz, 2002). The majority of participants reported having a healthy weight (61%; 54% female/46% male). A total of 3.2% of participants were underweight (63% female), and 20% of all participants fell into the overweight or obese categories. Of these overweight/obese participants, 12.7% (37% female) met criteria for being overweight and 7.3% (23% female) met criteria for being obese. Of the total sample, 15.9% were missing one or a combination of height, weight, and date of birth, prohibiting the calculation of BMI percentile by age. Missing data met the criteria for missing at random and were incorporated using full information maximum likelihood as implemented in Amos version 16.0 (Arbuckle & Wothke, 1999).

Data Analysis

T-tests were conducted to examine gender differences for all variables at Times 1 and 2. Pearson correlations were used to examine bivariate associations among all constructs.

To examine hypothesized reciprocal, longitudinal associations, a multiple-group (by gender) path analysis was conducted using structural equation modeling and full information maximum likelihood as implemented in Amos version 16.0. For both groups (i.e., for boys

and girls), Time 1 predictors included all three Time 1 peer relations constructs (i.e., likeability, popularity, and victimization) and all four Time 1 weight-related behaviors and cognitions (i.e., body dissatisfaction, negative weight-related cognitions, muscle-gaining behaviors, and weight management behaviors). These same seven variables at Time 2 were included in the model as outcomes.² Autocorrelations across time were estimated for all seven variables. Paths were estimated between each Time 1 peer relations construct and Time 2 weight-related construct, and between each Time 1 weight-related construct and Time 2 peer relations construct. The association between BMI, age, and pubertal development at Time 1 and every Time 2 variable also was estimated. Thus, this analysis allowed for an examination of reciprocal, prospective longitudinal associations, controlling for continuity in behavior over time, and adolescents' BMI, age, and pubertal development. This analytic approach also controlled for covariance among all predictors and estimated each path while considering all other estimated paths in the model.

A multiple group analysis was conducted to yield separate standardized estimates for boys and girls. The statistical significance of gender interactions was examined by comparing models with paths either fixed or allowed to vary freely between groups. The significance of χ^2 difference tests between nested models was used to evaluate gender differences in the magnitude of estimated paths.

Results

Preliminary Analyses

Table 1 includes means and standard deviations for all variables at each time point, as well as the results of analyses conducted to examine gender differences for each variable. At Time 1, girls had significantly higher levels of likeability and negative weight-related cognitions and were more pubertally developed than boys, whereas boys had significantly higher levels of muscle-gaining behaviors and higher BMIs than girls. There were similar gender differences observed at Time 2 among the weight-related constructs such that girls had significantly higher levels of negative weight-related cognitions and weight management behavior than boys, and boys had significantly higher levels of muscle-gaining behaviors than girls.

²Initial analyses were conducted in an attempt to combine measures of peer relations, and measures of weight-related behaviors and cognitions into separate latent factors. Unfortunately, subscales did not load well onto latent constructs in this dataset, perhaps because of differences in question and response formats between the measures used in this study.

Table 1. Means (and Standard Deviations) for Primary Variables at Times 1 and 2

	Boys	Girls	<i>t</i> (576)
Time 1			
Peer relations constructs			
Likeability	0.02 (1.00)	0.24 (0.82)	-2.89*
Popularity	0.04 (1.04)	0.12 (0.93)	-0.91
Victimization	-0.04 (1.06)	-0.10 (0.68)	0.85
Weight-related behaviors and cognitions			
Body dissatisfaction	0.95 (0.94)	0.93 (0.87)	0.26
Negative body-related cognitions	1.87 (0.93)	2.45 (1.14)	-6.80**
Muscle-gaining behaviors	2.48 (1.17)	1.90 (0.86)	6.82**
Weight management behaviors	1.94 (1.25)	2.14 (1.31)	-1.91
Body mass index	20.73 (4.01)	19.15 (3.41)	4.78**
Pubertal development	2.28 (0.64)	2.76 (0.73)	-8.47**
Age	12.66 (0.98)	12.60 (0.90)	0.79
Time 2			
Peer relations constructs			
Likeability	-0.01 (1.05)	0.17 (0.83)	-2.20*
Popularity	0.06 (1.03)	0.01 (0.93)	0.59
Victimization	0.02 (1.06)	-0.07 (0.66)	1.10
Weight-related behaviors and cognitions			
Body dissatisfaction	0.83 (0.89)	0.89 (0.90)	-0.80
Negative body-related cognitions	1.77 (0.95)	2.50 (1.21)	-8.02**
Muscle-gaining behaviors	2.39 (1.17)	1.94 (0.87)	5.19**
Weight management behaviors	1.85 (1.21)	2.10 (1.29)	-2.42*

p* < .05; *p* < .001.

Pearson correlations were conducted separately for boys and girls to examine bivariate associations between all continuous variables (see Table II). Correlations were similar for boys and girls and across the two time points. All peer relations constructs were significantly related. Higher levels of likeability were associated with higher levels of popularity, and higher levels of both types of status were associated with lower levels of victimization. For weight-related constructs, higher levels of one weight-related variable generally were associated with higher levels of the other weight-related variables. Higher BMI was associated with lower levels of likeability and popularity, and higher levels of weight-related behaviors and cognitions. Greater pubertal development and being older generally were associated with higher levels of weight-related behaviors and cognitions.

Model Testing

An initial model allowing all path coefficients and covariances to vary freely by gender yielded a poor fit,

χ^2 (78) = 573.96; χ^2/df = 7.36; CFI = .90; RMSEA = 0.10. Because multiple outcomes shared method variance (i.e., the peer relations constructs all were peer-reported, and the weight-related behaviors and cognitions all were self-reported), the Time 2 error terms within each set of variables (i.e., peer relations constructs, weight-related behaviors, and cognitions) were then allowed to correlate. This produced an improved model fit, χ^2 (60) = 117.39; χ^2/df = 1.96; CFI = 0.99; RMSEA = 0.04.

Next, paths were tested for invariance across gender to increase model parsimony. Paths were fixed if doing so did not significantly worsen the model. First, the correlations between the outcome error terms were tested. Constraining the covariance between the error terms among the peer relations constructs across gender produced a significantly worse model fit; thus, these correlations were allowed to vary freely across gender. The covariance between the error terms of the weight-related constructs all were constrained, with the exception of the correlation between the error terms of negative weight-related cognitions and weight management behaviors. These constraints produced a slightly improved model fit, χ^2 (65) = 118.91; χ^2/df = 1.83; CFI = 0.99; RMSEA = 0.04.

Covariance paths among all peer relations constructs, weight-related constructs, BMI, age, and pubertal development next were tested for differences across gender. Chi-square difference tests suggested that seven covariances could be fixed across gender without significant decrease in model fit. Thus, each of these paths was constrained for overall model parsimony: covariance between negative weight-related cognitions and pubertal development; negative weight-related cognitions and age; muscle-gaining behavior and weight management behaviors; body dissatisfaction and BMI; body dissatisfaction and pubertal development; weight management behaviors and pubertal development; and weight management behaviors and age, χ^2 (98) = 153.45; χ^2/DF = 1.57; CFI = 0.99; RMSEA = 0.03.

Last, gender was examined as a moderator of all estimated paths between the Time 1 and Time 2 variables. By again using χ^2 difference tests, it was revealed that all paths between Time 1 and 2 variables could be constrained across gender, with the exception of five paths that appeared to be moderated significantly by gender: paths between Time 1 age and Time 2 popularity, *B* = -0.03, *ns* for boys, *B* = 0.04, *ns* for girls; Time 1 pubertal development and Time 2 negative weight-related cognitions (discussed below); Time 1 popularity and Time 2 muscle-gaining behavior (discussed below); Time 1 muscle-gaining behavior and Time 2 victimization,

Table II. Covariances among Peer Relations Constructs and Weight-Related Behaviors and Cognitions

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Time 1																	
1. Likeability	-	0.72**	-0.69**	-0.10	-0.16**	0.03	-0.05	-0.19**	0.04	0.03	0.76**	0.69**	-0.53**	-0.01	-0.13*	0.12*	-0.03
2. Popularity	0.64**	-	-0.56**	-0.11	-0.10	0.22**	0.04	-0.10	0.11	0.09	0.63**	0.85**	-0.53**	-0.03	-0.07	0.28**	0.03
3. Victimization	-0.59**	-0.34**	-	0.04	0.07	-0.03	-0.06	0.05	-0.06	-0.07	-0.60**	-0.49**	0.72**	0.01	0.02	-0.06	0.01
4. Body dissatisfaction	-0.14*	-0.23**	0.15*	-	0.52**	0.05	0.36**	0.23**	-0.15*	-0.06	-0.18*	-0.27**	0.12	0.51**	0.47**	0.04	0.27**
5. Negative body-related cognitions	-0.04	0.02	-0.02	0.54**	-	-0.01	0.58**	0.53**	-0.01	-0.07	-0.16*	-0.23**	0.08	0.40**	0.78**	-0.04	0.44**
6. Muscle-gaining behavior	0.01	0.14*	0.02	0.05	0.01	-	0.39**	0.01	0.22**	0.18**	0.01	0.13	-0.11	0.04	0.02	0.53**	0.15*
7. Weight management behavior	0.02	0.06	-0.03	0.41**	0.60**	0.37**	-	0.38**	0.05	-0.03	-0.02	-0.05	-0.06	0.27**	0.55**	0.13*	0.43**
8. Body mass index	-0.11	-0.20**	0.09	0.50**	0.53**	-0.03	-0.38**	-	0.24**	0.17**	-0.15	-0.20**	-0.01	0.17**	0.48**	0.00	0.39**
9. Pubertal development	0.04	0.04	0.04	0.06	0.29**	0.15*	0.26**	0.23**	-	0.54**	-0.01	0.13*	-0.09	-0.13*	0.04	0.27**	0.17**
10. Age	0.03	0.04	0.02	0.00	0.12*	0.14*	0.19**	0.15*	0.56**	-	-0.01	0.05	-0.10	-0.11	-0.03	0.27**	0.09
Time 2																	
11. Likeability	0.65**	0.58**	-0.44**	-0.21**	-0.10	0.03	-0.03	-0.26**	0.08	0.12*	-	0.72**	-0.69**	-0.11	-0.12	0.20**	-0.02
12. Popularity	0.59**	0.90**	-0.34**	-0.18**	0.03	0.12	0.06	-0.21**	0.07	0.11	0.64**	-	-0.67**	-0.12	-0.20**	0.29**	-0.06
13. Victimization	-0.39**	-0.43**	0.73**	0.23**	-0.02	-0.03	-0.01	0.08	0.09	0.03	-0.52**	-0.48**	-	0.07	0.07	-0.13*	0.04
14. Body dissatisfaction	-0.12	-0.13*	0.05	0.64**	0.50**	0.09	0.36**	0.44**	0.10	-0.01	-0.26**	-0.21**	0.06	-	0.46**	0.02	0.27**
15. Negative body-related cognitions	-0.08	0.04	0.04	0.43**	0.73**	0.07	0.46**	0.42**	0.31**	0.13*	-0.06	-0.06	-0.03	0.51**	-	0.02	0.59**
16. Muscle-gaining behavior	0.07	0.10	0.01	0.02	0.07	0.43**	0.23**	-0.11	0.10	0.16**	0.03	0.03	0.07	0.01	0.12*	-	0.30**
17. Weight management behavior	-0.03	0.03	0.03	0.34**	0.49**	0.21**	0.51**	0.31**	0.20**	0.15*	-0.04	-0.04	0.08	0.36**	0.61**	0.39**	-

Note. Correlations of primary variables among adolescent boys reported in top half of table and correlations among girls represented in the bottom half of the table.

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

$B = -0.05$, ns for boys, $B = 0.05$, ns for girls; and Time 1 BMI and Time 2 body dissatisfaction (discussed below). This final model yielded a good fit, $\chi^2(145) = 203.43$; $\chi^2/DF = 1.40$; CFI = 0.99; RMSEA = 0.03.

Significant Paths

Results revealed several significant paths demonstrating longitudinal associations between peer status and weight-related behaviors and cognitions (Table III).

Peer Relations Constructs as Predictors

Results suggested that only peer status was associated longitudinally with later weight-related constructs. For both genders, lower levels of likeability, but higher levels of popularity, were associated longitudinally with increases in negative weight-related cognitions, likeability: $B = -0.12$, $p < .05$; popularity: $B = 0.08$, $p < .05$. For boys, higher levels of popularity were associated longitudinally with increases in muscle-gaining behaviors, $B = 0.21$, $p < .01$. There were no longitudinal associations between victimization and weight-related constructs.

Weight-related Behaviors and Cognitions as Predictors

Only body dissatisfaction was associated longitudinally with popularity. For both boys and girls, lower levels of

body dissatisfaction were associated longitudinally with increases in popularity, $B = -0.10$, $p < .01$. No other weight-related behaviors or cognitions were related to any of the peer constructs.

BMI

BMI was associated longitudinally with likeability and weight-related constructs for both boys and girls. Across both genders, lower BMI was associated longitudinally with increases in likeability, $B = -0.02$, $p < .01$. Higher BMI was associated longitudinally with increases in negative weight-related cognitions, $B = 0.03$, $p < .01$, and weight management behaviors for both boys and girls, $B = 0.08$, $p < .01$. Only among girls, however, was higher BMI associated longitudinally with increases in body dissatisfaction, $B = 0.06$, $p < .01$. BMI was not associated longitudinally with popularity, victimization, or muscle-gaining behaviors.

Pubertal Development

Pubertal development only was associated with negative body-related cognitions. For girls, greater pubertal development was associated longitudinally with increases in negative body-related cognitions, $B = 0.02$, $p < .05$.

Table III. Longitudinal Associations Between Peer Relations Constructs and Weight-Related Behaviors and Cognitions; Unstandardized Regression Weights (SE)

Time 1 Predictor	Time 2 peer relations constructs			Time 2 weight-related behaviors			
	Likeability	Popularity	Victimization	Body dissatisfaction	Negative body-related cognitions	Muscle-gaining behaviors	Weight management
Body dissatisfaction	-0.05 (0.04)	-0.10 (0.03)**	0.05 (0.03)				
	<i>-0.05 (0.04)</i>	<i>-0.10 (0.03)**</i>	<i>0.05 (0.03)</i>				
Negative body-related cognitions	0.01 (0.04)	0.02 (0.03)	0.00 (0.03)				
	<i>0.01 (0.04)</i>	<i>0.02 (0.03)</i>	<i>0.00 (0.03)</i>				
Muscle-gaining behaviors	-0.04 (0.03)	0.01 (0.02)	-0.05 (0.04)				
	<i>-0.04 (0.03)</i>	<i>0.01 (0.02)</i>	<i>-0.05 (0.04)</i>				
Weight management behaviors	0.04 (0.03)	0.02 (0.02)	-0.03 (0.02)				
	<i>0.04 (0.03)</i>	<i>0.02 (0.02)</i>	<i>-0.03 (0.02)</i>				
Body mass index	-0.02 (0.01)*	0.00 (0.01)	0.00 (0.01)	0.02 (0.01)	0.03 (0.01)**	-0.01 (0.01)	0.08 (0.01)**
	<i>-0.02 (0.01)*</i>	<i>0.00 (0.01)</i>	<i>0.00 (0.01)</i>	<i>0.06 (0.01)**</i>	<i>0.03 (0.01)**</i>	<i>-0.01 (0.01)</i>	<i>0.08 (0.01)**</i>
Pubertal development	0.00 (0.05)	0.01 (0.04)	0.05 (0.04)	0.03 (0.05)	0.04 (0.06)	0.03 (0.06)	0.14 (0.08)
	<i>0.00 (0.05)</i>	<i>0.01 (0.04)</i>	<i>0.05 (0.04)</i>	<i>0.03 (0.05)</i>	<i>0.20 (0.70)**</i>	<i>0.03 (0.06)</i>	<i>0.14 (0.08)</i>
Age	0.03 (0.03)	-0.03 (0.03)	-0.03 (0.03)	-0.08 (0.04)*	-0.02 (0.04)	0.14 (0.05)**	0.01 (0.06)
	<i>0.03 (0.03)</i>	<i>0.04 (0.03)</i>	<i>-0.03 (0.03)</i>	<i>-0.08 (0.04)*</i>	<i>-0.02 (0.04)</i>	<i>0.14 (0.05)**</i>	<i>0.01 (0.06)</i>
Likeability				-0.02 (0.05)	-0.12 (0.05)*	0.06 (0.06)	0.01 (0.08)
				<i>-0.02 (0.05)</i>	<i>-0.12 (0.05)*</i>	<i>0.06 (0.06)</i>	<i>0.01 (0.08)</i>
Popularity				0.03 (0.04)	0.08 (0.04)*	0.21 (0.07)**	0.08 (0.06)
				<i>0.03 (0.04)</i>	<i>0.08 (0.04)*</i>	<i>0.01 (0.06)</i>	<i>0.08 (0.06)</i>
Victimization				-0.02 (0.05)	-0.03 (0.04)	0.09 (0.06)	0.08 (0.07)
				<i>-0.02 (0.05)</i>	<i>-0.03 (0.04)</i>	<i>0.09 (0.06)</i>	<i>0.08 (0.07)</i>

Note. Non-italics indicates results for boys; *Italics* indicates results for girls.

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

Age

Age was only associated with weight-related behaviors and cognitions. For boys and girls, being younger was associated longitudinally with increases in body dissatisfaction, $B = -0.08$, $p < .05$. Also, for boys and girls, being older was associated longitudinally with increases in muscle-gaining behaviors, $B = 0.14$, $p < .01$.

Discussion

Research suggests that the peer context is a unique arena in which adolescents' adherence to specific health behaviors is maintained through both reinforcement of conformity to, and social sanctions for non-conformity to, these behaviors. This study examined whether sociometrically derived ratings of peer status (i.e., likeability and popularity) and peer victimization might be associated reciprocally with adolescents' weight-related behaviors and cognitions over time, controlling for age, pubertal development, and BMI.

The study's findings partially supported the hypothesis that peer status (i.e., likeability and popularity) is associated longitudinally with weight-related behaviors and cognitions. Interestingly, results suggested that adolescents who are *less* liked and adolescents who are *more* popular have higher levels of negative body-related cognitions over time. It may be that popularity reinforces a tendency to develop concerns over one's body; however, being well liked may be associated with more adaptive body cognitions. This seemingly contradictory finding is consistent with work on other health risk behaviors that similarly suggests that low likeability, but high popularity, may reinforce risk behavior engagement (e.g., aggression, Prinstein & Cillessen, 2003; sexual risk behavior, Prinstein, Meade, & Cohen, 2003). Indeed, recent research has suggested considerable variability in the likeability of popular adolescents (de Bruyn & Cillessen, 2006), and it may be that popular, but unliked adolescents are distressed by their low likeability and will go to lengths to maintain what status they have (e.g., higher popularity associated with later negative body-related cognitions). At this time, there is no empirical research suggesting that highly popular youth are concerned with their likeability, and it is important to note that the presented data are not simultaneously considering the popularity and likeability of each adolescent. Nonetheless, future research should examine the interaction between popularity and likeability in relation to weight-related behaviors and cognitions, as it could identify a subgroup of adolescents who may be at higher risk of developing an eating disorder.

Popularity also was associated with higher levels of muscle-gaining behaviors over time; however, this was only observed among boys. This is consistent with prior research suggesting that a muscular body ideal has emerged among men and boys (e.g., Carfi et al., 2006) and that muscle-gaining behaviors are more salient to boys than girls.

These findings have important clinical implications. Similar to Graham et al.'s (2000) findings, results from this study suggest that being well liked may provide protection from engagement in weight-related behaviors and cognitions. If well-liked adolescents engage in fewer weight-related behaviors and cognitions, it may be useful to involve them in peer-directed prevention efforts, such as those currently being examined for efficacy by Becker and colleagues (e.g., Becker, Bull, Schaumberg, Cauble, & Franco, 2008).

In contrast to findings suggesting peer status is associated with later weight-related behaviors and cognitions, there was little support for the second hypothesis, suggesting that weight-related behaviors and cognitions would be associated longitudinally with peer constructs. With the exception of body dissatisfaction, no weight-related behaviors or cognitions predicted later peer status or victimization. Lower body dissatisfaction was associated longitudinally with higher levels of popularity over time. That is, being *satisfied* with their bodies was associated with increases in adolescents' popularity over time. This is in contrast to the finding that being more popular was associated longitudinally with negative body-related cognitions. It may be that this represents a distinction between adolescents' accepting their overall body shape (i.e., low body dissatisfaction using pictorial indicators), and wanting to make changes where they can (i.e., endorsement of negative body-related cognitions). It would be helpful to clarify the differences between these two constructs to increase specificity for future research examining weight-related behaviors and cognitions. Although body dissatisfaction and negative body-related cognitions were highly correlated in this study, they clearly are examining different ways of feeling negatively about body shape, suggesting different approaches may be necessary in addressing these concerns in prevention and intervention programs.

Surprisingly, findings did not support the hypothesis that peer victimization may be an antecedent or consequence of weight-related behaviors and cognitions. This is in contrast to prior research, but may be due to four conceptual and methodological distinctions between this study and prior work. First, some prior work on victimization and weight-related constructs has focused

specifically on body-related teasing and/or has examined only concurrent associations (e.g., Neumark-Sztainer et al., 2002). Second, some previous research has revealed that peer victimization is evident among those who are overweight or obese (e.g., Pearce, Boergers, & Prinstein, 2002; Sweeting, Wright, & Minnis, 2005). The percentage of participants in this study who met criteria for being overweight/obese was slightly lower than the national youth average, which may have attenuated the results. Third, a multivariate approach was used for these analyses, which examined the associations between peer victimization and weight-related behaviors and cognitions while controlling for associations with other measures of peer functioning (i.e., peer status), as well as age, pubertal development, and BMI. Last, most of the earlier studies have examined adolescents' self-reported peer victimization. Research suggests that youths' own reports of victimization likely are biased (De Los Reyes & Prinstein, 2004); thus, it is unclear from this prior work whether weight-related behaviors and cognitions may only be associated with *perceptions* of victimization by peers. Moreover, research should clarify if different types of victimization (i.e., overt versus relational victimization) are associated differentially with weight-related behaviors and cognitions. Given the literature describing the association between obesity, peer victimization, and poor psychosocial adjustment (e.g., Storch et al., 2007), it would be important to revisit the hypothesis that victimization both predicts and is predicted by weight-related behaviors and cognitions using both peer- and self-report measures of victimization in an adolescent sample with a higher percentage of overweight/obese youth.

Despite a rigorous methodological approach in this study, there are several limitations that should be addressed in future research. First, an issue within the weight-related literature generally is that existing weight-related measures focus specifically on disordered eating risk behaviors and cognitions relevant to adolescent girls. More accurate measures of weight-related attitudes and behaviors for boys are needed. Indeed, in this study, the internal consistencies of the weight-related behavior and cognition measures were stronger for girls than boys on all instruments, with the exception of the measurement of muscle-gaining behaviors. As such, the findings reported here may underestimate the longitudinal bidirectional associations between peer relations constructs and weight-related behaviors and cognitions relevant to boys.

Second, this study used relatively brief screening instruments to examine constructs of weight-related behaviors and cognitions. Consequently, the measures in this study did not provide as thorough an assessment of

these constructs as existing instruments that have more extensive validity data and clinical cutoff points to determine levels of eating pathology (e.g., EDI-3; Garner, 2004). Despite acceptable internal consistency for the majority of these measures, the low internal consistencies of muscle-gaining behaviors for girls and weight management behavior for boys may have attenuated the current findings. Replication of this study using more established instruments would be useful, and may yield stronger results.

Third, as previously mentioned, this sample had a slightly lower prevalence of overweight/obesity (~20%) than the national rate (~30%; Ogden, Carroll, & Flegal, 2008), which may have minimized the results of this study. It is unclear whether participants were unusually fit, or if there was bias in their self-reported height and weight. It would be important to reexamine the association between peer status and victimization and weight-related behaviors and cognitions in a sample with a more nationally representative distribution of BMI using BMIs calculated from height and weight measured by the researchers.

Fourth, adolescents' height and weight data were gathered before any weight-related cognition questions and behavior questions were presented. It may be that asking participants to provide their height and weight before answering body and weight-related questions negatively primed their later responses (i.e., overreporting of weight-related behaviors and cognitions). However, if BMI data had been collected after weight-related behavior and cognition questions, it is possible that participants might have overestimated their body size. Some research suggests negative priming effects from BMI as well as mood cues among women with bulimia nervosa on body dissatisfaction and perceived body size (e.g., Carter, Bulik, Lawson, Sullivan, & Wilson, 1996; Kulbartz-Klatt, Florin, & Pook, 1999). Future research designs should carefully consider the placement of BMI data questions in regards to other weight-related items, given the potential for negative participant priming.

Fifth, this study examined only early adolescents. Research suggests that popularity is salient to younger adolescents (Cillessen & Mayuex, 2004), but it would be important to explore if peer status continues to be influential with regards to weight-related behaviors and cognitions during later adolescence.

Overall, findings from this study suggested that weight-related behaviors and cognitions might be associated with peer status and peer victimization. It may be that through provision of higher regard among peers or sanctions in the form of peer maltreatment, weight-related

behaviors, and cognitions are reinforced within the peer context. In future research, it will be important to explore the differing values and/or reinforcements associated with weight-related behaviors and cognitions among well-liked and popular adolescents. Further understanding of the longitudinal associations between peer constructs and weight-related behaviors and cognitions ultimately will help to improve prevention and intervention strategies, and the identification of adolescents who may be most at risk for eating pathology.

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