Potential Mechanisms of Peer Influence on Adolescent Girls' Disordered Eating Behavior: An Experimental Design

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Abstract

DIANA M. RANCOURT: Potential Mechanisms of Peer Influence on Adolescent Girls' Disordered Eating Behavior: An Experimental Design
(Under the direction of Mitchell J. Prinstein)

This study used an experimental paradigm to examine two factors that may influence the socialization process of peer influence on adolescent females' vulnerability to engage in disordered eating behavior: body-related social comparison and desire to emulate a popular prototype. In the first phase of this study, data were collected to establish local body and dieting norms, as well as to construct study manipulations. In the second phase of the study, subjects participating in the experimental portion were randomly assigned to one of three experimental conditions in which they were exposed to maladpative eating norms by ostensible female peers who were either: 1) thin and of popular peer status; 2) thin and of average peer status; or 3) heavy and of average peer status. Hypotheses were partially supported. Differences emerged in response patterns between 9th and 10th grade participants. Ninth grade participants generally experienced peer influence of disordered eating behaviors. Tenth grade participants, however, did not appear to experience peer influence of disordered eating behaviors. An interaction between body mass index (BMI) and grade was observed such that 9th graders with lower BMI responded significantly more maldaptively in the experimental condition than 10th graders with lower BMI. Results suggest body size was most salient to 9th grade participants' peer influence vulnerability. Peer-led interventions may be particularly effective, but should be tailored to norms within the specific peer context.

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Introduction

Epidemiologic data suggest that the adolescent transition presents a unique vulnerability period for youths' engagement in behaviors to alter their body shape (CDC, 2008). Diagnosed eating disorders currently are the third most common chronic illness among adolescent females (Croll, Neumark-Sztainer, Story, & Ireland, 2002), and sub-threshold levels of these behaviors have been reported at a rate of almost 50% among female high school students (CDC, 2008). Importantly, eating disorders and sub-threshold eating risk behaviors in adolescence may have life-course consequences, such as amenorrhea, osteoporosis, cardiac arrest, electrolyte imbalance, and teeth and throat erosion (e.g., Fisher, et al., 1995). Recent statistics indicate that 60% of female high school students report actively attempting to lose weight, with up to 16% of high school females reportedly using unhealthy weight control strategies such as taking laxative or diet pills, vomiting, or fasting (CDC, 2008). Even more concerning is that these unhealthy behaviors often occur in the absence of adolescents' actual weight concerns: only 35% of high school girls described themselves as "slightly" or "very" overweight (CDC, 2008). The frequency with which adolescent females are engaging in maladaptive eating behaviors underscores the importance of identifying precipitating factors in order to develop effective prevention programs.

Given the high level of disordered eating behaviors among adolescent females, researchers have started to consider the potential mechanisms behind adolescent girls' adoption of maladaptive eating behaviors and attitudes in order to better inform prevention programming. One theoretical mechanism that may be particularly relevant to adolescent girls' disordered eating behaviors and attitudes is the increasingly important role of peers

during adolescence. Peer influence of disordered eating behaviors may be particularly crucial during this developmental period for a number of reasons. First, peer interactions increase dramatically at the transition to adolescence (Larson, Richards, Moneta, Holmbeck, & Duckett, 1996), particularly during mealtimes (e.g., snack and lunchtime at school). These peer relationships are essential to adolescents' identity formation (Pugh & Hart, 1999) as peers become the basis of cognitive and social resources, gradually replacing parents in providing guidance, knowledge, and support (Hartup, 1996). Second, body-related social comparisons between adolescents are of increased importance during the pubertal transition (e.g., Berger, Weitkamp, & Strauss, 2009; Schutz, Paxton, & Wertheim, 2002). Discrepancies in pubertal development paired with the beginning of romantic interactions heighten the salience and implications of body shape and size. Third, discussions of appearance, body, and weight-related behaviors are common among adolescents (Jones & Crawford, 2006; Paxton, Schutz, Wertheim, & Muir, 1999; Wertheim, Paxton, Schutz, & Muir, 1997), which may lead to reinforcement of societal beauty norms, including the thinness norm. Indeed, peer-related influences have been found to be more important than parental influences in regards to disordered eating behaviors and negative body-related attitudes (Keery, van den Berg, & Thompson, 2004; Shroff & Thompson, 2006). The increased importance of peers in conjunction with comparisons of, and discussions about, body and appearance makes it highly likely that peers become a unique source of eating behavior social norms during the adolescent transition.

Preliminary empirical evidence suggests that peer processes may be relevant for eating risk behavior. Studies of related constructs, such as perceived peer pressure (Paxton et al., 1999; Pike, 1995; Thompson, et al., 2007; Young, McFatter, & Clopton, 2001; Vincent & McCabe, 2000), perceived dieting norms (e.g., Eisenberg, Neumark-Sztainer, Story, & Perry, 2005), media pressures (e.g., Paxton et al., 1999; Young et al., 2001), and teasing (Lieberman, Gauvin, Bukowski, & White, 2001; Thompson et al., 2007) all have

suggested that peer factors may be associated with adolescents' disordered eating behavior.

Despite promising preliminary evidence supporting the impact of peer factors on adolescent females' eating pathology, this past research has a number of limitations. First, the peer factors described above are conceptually distinct from the proposed socialization processes of this study. As they currently have been studied, peer factors are perceptions of peers' actions and behaviors that may be associated with disordered eating behaviors and attitudes. In contrast, peer influence research seeks to describe and understand the similarities between friends' attitudes and behaviors through friend selection and/or socialization processes. Selection suggests that adolescents choose friends who have similar attitudes or behaviors. Socialization suggests that adolescents become more similar to their friends in attitudes and behaviors over time. Research supports socialization processes for a variety of health risk behaviors including alcohol (see Bosari & Carey, 2001; Hawkins, Catalano, & Miller, 1992 for reviews), tobacco (e.g., Ennett & Bauman, 1994), marijuana use (e.g., Kandel, 1978; Wills & Cleary, 1999), and sexual risk behavior (Billy & Udry, 1985; Prinstein, Meade, & Cohen, 2003). Socialization may be particularly important to understanding adolescent girls' disordered eating behavior, but this process has been woefully understudied with regards to eating attitudes and behaviors.

Second, peer influence research often lacks a theoretical basis. Existing research has examined whether peer influence occurs, but not how or why it occurs. Although important, these findings are not maximally informative, especially as related to the development of effective prevention efforts. Thus, it is also imperative that research examine the theoretical mechanisms and moderators of socialization in order to identify ways through which peer conformity may be altered. Moreover, integrative research relying on social psychology theories and developmental psychology methods offers a unique opportunity to understand fully the mechanisms and moderators of peer influence that could be informative

to preventive efforts. To that end, this study incorporates methodology and theory from the developmental, social, and clinical psychology literatures to achieve a broader understanding of how and why adolescent girls may be engaging in eating risk behavior.

Indeed, social psychology offers two theories that may be particularly relevant to understanding factors impacting the socialization of adolescent girls' disordered eating behavior. First, social comparison theory suggests that individuals compare themselves to others and then act to reduce discrepancies between themselves and their comparison group (Festinger, 1954). A growing number of researchers have applied Festinger's (1954) theory to understand the association between adolescents' self versus other body comparisons and concurrent eating risk behavior and attitudes via survey studies (Berger et al., 2009; Holt & Ricciardelli, 2002; Jones, 2001; Jones, 2004; Muris, Meesters, van de Blom, & Mayer, 2005; Schutz et al., 2002). Overall, findings from this research suggest body comparisons are associated both with increased body dissatisfaction, as well as engagement in disordered eating behavior among adolescents. Unfortunately, the majority of these studies are cross-sectional, and all are correlational. Although these data provide important preliminary evidence of an association between body-related social comparisons and disordered eating behaviors and attitudes, they do not elucidate causal relationships. Understanding causal factors in the association between body-related social comparison and maladaptive eating behaviors and attitudes is imperative in order to develop age-appropriate effective intervention strategies.

Despite the dearth of experimental approaches to body comparison hypotheses, two studies using undergraduate female participants have creatively applied experimental designs to social comparison and disordered eating and attitude questions (Krones, Stice, Batres, & Orjada, 2005; Wasilenko, Kulik, & Wanic, 2007). One study examined the impact of body comparisons on levels of self-reported body dissatisfaction by exposing participants to either a thin female peer or an average-sized female peer. Results suggested that

exposure to the thin peer was uniquely related to increases in body dissatisfaction (Krones et al., 2005). A second study examined changes in actual exercise behaviors associated with exposure to a thin, fit female peer. Female participants were exposed to a thin female peer, an average-sized female peer, or an overweight female peer while exercising in the university gym. Participants exposed to the thin, fit peer exercised for significantly longer than participants exposed to either the average-sized or overweight peer (Wasilenko et al., 2007). These findings underscore the immediate impact of exposure to a thin peer; however, only one study examined the association between body-related social comparison and actual behaviors (Wasilenko et al., 2007). More research is needed to explore the range of behaviors that may be affected by females' exposure to a thin peer (e.g., dieting), especially among adolescent females. Further, moderating factors of the social comparison process should be investigated to increase the ability to identify specific situations that may increase adolescent girls' susceptibility to the negative effects of body-related social comparison.

Indeed, it may not be sufficient only to consider the impact of body-related social comparisons on actual behaviors among adolescent girls; there may be other peer-related factors that moderate the effects of social comparisons on adolescent girls' disordered eating behaviors and attitudes. Given the importance of peer acceptance and peer group conformity during the adolescent transition (Brown, 1990), the prototype/willingness model also may be helpful to understand theoretical mechanisms associated with adolescent girls' maladaptive eating risk behavior. This social psychology theory suggests that the process of social comparison may be especially potent for changing behavior when individuals evaluate themselves against an "ideal," which often is a high status prototype (Gibbons, Gerrard, & Lane, 2003; Gibbons, Gerrard, Reimer, & Pomery, 2006). Specifically, the more favorable the image of the comparison peers (i.e., the "prototype"), the more likely adolescents will be to engage in behaviors associated with that image if given the

opportunity (i.e., “willingness”; Gibbons et al., 2003; Gibbons et al., 2006). Indeed, youth are especially likely to engage in behaviors that they feel are associated with high levels of peer status (e.g., Cohen & Prinstein, 2006; Engels, Scholte, van Lieshout, de Kemp, & Overbeek, 2006), and ideal prototypes are explicitly rewarded in adolescence via social rewards (Gibbons, Lane, Gerrard, Pomery, & Lautrup, 2002). Further, adolescents’ ongoing identity formation processes likely make them especially attuned to prototype information that contributes to their self-concept.

The prototype/willingness model has been tested with adolescents with regard to alcohol (Gerrard et al., 2002; Spijkerman, van den Eijnden, Vitale, & Engles, 2004), smoking behavior (Gibbons, Gerrard, Blanton, & Russell, 1998; Spijkerman et al., 2004), and college students’ pregnancy-risk behaviors (Gibbons et al., 1998; Myklestad & Rise, 2007), but as yet has not been applied to eating risk behavior. Based on the pattern of findings of the application of the prototype/willingness model to other adolescent health risk behaviors, as well as research suggesting maladaptive eating behaviors and attitudes may be rewarded within the peer context via increased popularity (Rancourt & Prinstein, 2010), this study proposes that adolescent females’ body comparisons will be important to peer influence of disordered eating behavior when the comparison target is a high status peer to whom the adolescent aspires to emulate. In contrast, adolescent females’ body comparison will be less salient and less likely to induce peer influence of eating risk behavior when the comparison target is a peer who does not fit the “ideal” or high status prototype.

In order to examine adequately the impact of social comparison and ideal/high status prototypes on adolescent girls’ disordered eating behaviors, experimental designs are necessary. The majority of peer influence studies are cross-sectional and correlational, which neither allows for the discrimination of selection and socialization effects, nor for identification of causal inferences. To address this methodological gap, this study uses an innovative experimental paradigm to examine the socialization of eating risk behavior

susceptibility among adolescent females using an approach that integrates social comparison and prototype/willingness models. Specifically, the proposed study will manipulate both the body idealness and the popularity status of the prototype against which female adolescent participants compare themselves. Clarifying the prototype that may be most salient to adolescent girls' disordered eating behavior has important implications for prevention and intervention work. More recent interventions are emphasizing the importance of peers in the process of preventing disordered eating behavior (e.g., Becker, Smith, & Ciao, 2006) in addition to increasing dissonance related to the thinness norm (e.g., Stice, Marti, Spoor, Presnell, & Shaw, 2008). Identifying what prototype may be most influential over adolescent females' disordered eating behavior will allow further tailoring of these prevention/intervention approaches to address not only the individual risk factors, but also attend to broader interpersonal and contextual risk factors associated with these behaviors.

Further, this experimental approach also addresses a second methodological limitation within the peer influence literature, namely the inconsistent definition of who is a "peer." Some studies use the term "peer" to refer to the general social context (e.g., Unger, Rohrbach, Howard-Pitney, Ritt-Olson, & Mouttapa, 2001), whereas other studies reference a specific peer, such as a best friend (e.g., Urberg, 1992). This lack of agreement makes it difficult to compare results across studies, and to identify which reference group/individual may be most salient to adolescent females with regards to disordered eating behavior. More research is needed to elucidate which specific peers or peer groups are the most influential with regards to disordered eating behavior and attitudes. This study addresses this concern by identifying three prototypical peers within the experimental paradigm to ascertain to which peers adolescent girls are more likely to conform with regards to disordered eating behavior.

It is hypothesized that two qualities of the "prototype" are relevant to peer influence of eating risk behavior. First, it is expected adolescent girls will be especially susceptible to normative information communicated by peers who possess an "ideal/thin" body shape. In addition to thinness, it is anticipated that high levels of prototypes' peer status (i.e., popularity) also will lead to an increase in adolescents' susceptibility to peer influence. Indeed, peer group acceptance and conformity are essential to adolescents' self-worth, making it particularly likely that adolescents will adopt attitudes and engage in behaviors that will earn them status in the peer hierarchy (Brown, 1990; Rancourt & Prinstein, 2010). Thus, if an adolescent is comparing herself to a peer who is both thin and popular, the prototype/willingness model suggests the thin and popular prototype will be more influential with regards to potential eating risk behavior than if the prototype were only thin, only popular, or neither.

Previous experimental research examining body-related social comparison among college and adolescent women has focused on body dissatisfaction. Although this is an important construct, especially given that body dissatisfaction has been suggested to be one of the strongest longitudinal predictors of adolescents' eating disordered behavior (e.g., Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999), it does not clarify whether body-related comparisons may lead to maladaptive eating behavior. The goal of this study is to extend this line of research and quantify the likelihood that adolescents will be influenced to indicate willingness to engage in maladaptive eating behaviors. Of course, it would be unethical to attempt to induce disordered eating behaviors in participants; therefore, a disordered eating questionnaire has been developed and will be used as a proxy of adolescent girls' susceptibility to, and likelihood of engaging in disordered eating behavior. This instrument is described in more detail below.

In this study an established experimental design was used to examine potential mechanisms of the socialization process of peer influence with regards to adolescent girls'

eating risk behavior. It was hypothesized that female adolescents who are exposed to body and dieting social norms communicated by thin and popular female peers will be more likely to conform to eating risk behavior presented by these prototypes than female adolescents exposed to either 1) thin and average status, or 2) heavy and average status peers. The combination of heavy and popular status peers was not included as a condition in the experimental design as it would be unusual to have a popular and overweight adolescent female as larger body size generally is associated with lower popularity status (e.g., Rancourt & Prinstein, 2010; Wang, Houshyar, & Prinstein, 2006). It was further hypothesized that the peer influence effect will be moderated by body mass index (BMI), such that adolescents' larger body shapes (i.e., higher BMIs) will be associated with high levels of conformity across all three experimental conditions. In contrast, adolescents' lower BMI will be associated with progressively decreasing conformity to social norms communicated by 1) thin and popular peers, 2) thin and average status, and 3) heavy and average status peers, respectively.

Methods

Participants

Phase I participants included 136 female adolescents in grade 9 at Phase I baseline data collection. The ethnic composition of the sample included 64.7% White, 14% African American, 2.9% Asian American, 9.6% Latino American, and 7.4% of participants from mixed ethnic backgrounds (1.5% did not report their ethnic background). Participants were aged 12 (.7%), 14 (55.1%), 15 (36.8%) and 16 (2.2%) at Phase I baseline. Seven participants (5.1%) did not provide their birth date. One hundred and five (77.2%) participants provided sufficient data to calculate BMI. Four participants (2.9%) were underweight, 77 (56.6%) participants were a healthy weight, 11 (8.1%) participants were overweight, and 13 (9.6%) participants were obese. Average adult per capita income in the

county was approximately $47,063, and approximately 20% of students were eligible for free or reduced-price lunch.

Phase II participants included 113 female adolescents from the original Phase I sample. At the completion of Phase II, participants were in the 9th (58.4%) and 10th (41.6%) grades. The ethnic composition of the Phase II sample included 64.6% White, 12.4% African American, 3.5% Asian American, 11.5% Latino American, and 7.1% of participants from mixed ethnic backgrounds (0.9% did not report their ethnic background). Of the participants who provided sufficient information to calculate BMI (n=88; 78%), 65 (73.9%) were of a healthy weight, 3 (3.4%) were underweight, 11 (12.5%) were overweight, and 9 (10.2%) were obese. Forty-eight of the 113 participants who completed Phase II were missing some Phase I covariate data (42.4%; 79% 9th graders). These 48 participants were distributed evenly across conditions (Condition 1: n=16; Condition 2: n= 15; Condition 3: n = 17). Independent samples t-tests were used to examine data response patterns between participants who provided complete covariate data and those who did not. It was observed that participants missing Phase I covariate data responded significantly more maladaptively to the disordered eating scenarios (described below) at both Phase I and Phase II, and reported lower weight satisfaction than participants who had complete Phase I covariate data (Table 1). Given these important differences on the pre-test and outcome measure, as well weight satisfaction, only participants who provided complete data at both Phase I and Phase II were included in the analyses (N=65).

This final sample of 65 adolescent girls was 43.1% 9th grade participants. The majority of these 65 participants were of a healthy weight (75.4%). There were equal numbers of overweight (10.8%) and obese (10.8%) participants, and a small percentage (3.1%) of underweight participants. Of the 65, 70.8% were Caucasian and 29.2% were non-Caucasian (7.7% African-American, 4.6% Asian, 6.2% Hispanic/Latina, and 10.8% mixed ethnic backgrounds).

Procedure

Ninth grade students were recruited to participate in the study in the spring and fall of calendar year 2010. Consent forms for study recruitment were hand-distributed to all ninth graders, with strong encouragement and incentives for consent form return. Students who returned a signed form, regardless of consent status, received a $10 gift card of their choice to one of three merchants (i.e., WalMart, Target, or SouthPoint Cinemas). Students who returned signed forms also were eligible for four raffles: three $25 gift certificates and one grand prize (i.e., iPod Touch). All the incentives were offered during both recruitment periods. Additionally, in the fall 2010 teachers were offered a $10 gift card to a store or restaurant of their choice if they were able to achieve a consent form return rate of 80% or higher in their targeted classrooms.

In spring 2010, 275 students were recruited for participation in the study, of which 131 (48%) were female. One hundred and sixty-one students returned consent forms (59%), with 136 (84%) receiving parental consent to participate. Of this 136, 68 (50%) were female. In fall 2010, 287 students were recruited for participation in the study, of which 150 (52%) were female. One hundred and ninety-two students returned consent forms (67%), of which 145 (76%) provided parental consent to participate. Of this 145, 83 (57%) were female. In total, 151 (54% of total possible) female students received parental consent and were eligible to participate in the study.

Phase I data collection occurred in June 2010 and December 2010, immediately following consent collection for each cohort. Youth provided assent to participate in both phases of the study at Phase I. For the spring 2010 Phase I data collection, 60 (88%) of consented girls provided at least some baseline data. Eight participants did not attend data collection. For the fall 2010 Phase I data collection, 76 (92%) girls provided at least some baseline packet. One student transferred between recruitment and data collection, and

eight participants did not attend data collection. Thus, a total of 136 participants provided at least some Phase I baseline data.

Phase II data collection of both cohorts was conducted in February 2010, two months after the fall 2010 Phase I data collection, and eight months after the spring 2010 Phase I data collection. Of the 136 participants who provided at least some Phase I data, 124 were eligible to participate in the Phase II experimental paradigm. Nine students had withdrawn from school and three participants had not provided enough Phase I data to participate in the Phase II chat room. Of these 124 potential Phase II participants, 118 participants completed the Phase II chat room paradigm. Four students were absent the week of data collection, one had dropped out of school, and one declined to participate. One student completed the wrong experimental condition, leaving a total available Phase II sample of 117. Of these 117, four participants' data were discarded because of their self-reported suspicion about the study design, leaving a potential sample of 113 female adolescent participants. As described above, patterns in missing data supported including only participants with complete data, leaving a final sample of 65 adolescent girls.

Measures

A separate set of measures was used for each phase of the project. Data collected during Phase I were used to 1) construct study manipulations; 2) facilitate stratified randomization into Phase II; 3) collect data to use as covariates and moderators; and 4) establish local disordered eating behavior norms. Adolescents' date of birth was used to calculate age. Unless otherwise noted, all measures were calculated using the entire sample from Phase I data collection.

Disordered Eating Behavior Scenarios. Focus groups were conducted with recent high school graduates to construct the Disordered Eating Behavior (DEB) scenarios. The majority of focus group participants had graduated from high schools with similar location and/or diversity profiles to the high school where data for this project were collected,

suggesting that the focus group participants were representative of the population of interest at the target high school. The first all-female focus group was used to ascertain what types of situations may encourage disordered eating behavior, particularly in a peer context. Participants also provided information on different ways in which adolescent girls respond to these situations. Disordered eating scenarios were created based on this information, and then presented to a second focus group of recent high school graduates. The objective of the second focus group was to solicit feedback on the scenarios and response options to maximize their validity and believability. The DEB scenarios were revised based on suggestions from the second focus group. The final DEB scenarios each consist of a few sentences describing a situation in which adolescent females may find themselves feeling pressured to engage in disordered eating behavior. Six DEB scenarios were presented to participants, with target behaviors/attitudes ranging from public endorsement of body dissatisfaction to caloric restriction and exercise to severe dieting behaviors (e.g., using diet pills). Each DEB scenario had a range of five or six response options ranging from prosocial (e.g., “State that you’re reasonably happy with your body.”) to maladaptive (e.g., “Complain about how much you hate your appearance and wish you looked like someone else.”). The order of the response options was counterbalanced across the six scenarios.

These six DEB scenarios were used in three ways. First, they were administered during the initial Phase I survey to all 136 participants. Data from this assessment was analyzed to determine the normative (i.e., mean) response to each scenario among 9th and 10th grade female students in the overall study sample. This information was used to define a response for each scenario that is “above average” (i.e., +/- 1 SD) in its level of eating risk endorsement. This was done separately for each grade to tailor presented norms, as two DEB scenarios had different Phase I mean responses across the grades. As described below, these “above average” disordered eating responses later were attributed to either average or high status peers in the context of the experimental paradigm. Second, each of

the scenarios was presented again during the Phase II experimental paradigm to the subsample of 113 participants. In the context of the paradigm, participants' responses to the scenarios were used as dependent measures. Third, the Phase I pre-intervention scores on this instrument of the 113 adolescent females participating in the Phase II experimental manipulation were used as covariates in analyses assessing the effects of the Phase II experimental manipulation on these participants' vulnerability to disordered eating behaviors.

In order to create an average score, the six DEB scenarios first were individually standardized, and then an average score was computed across the six items. To create the pre-intervention (i.e., Phase I) DEB composite score, scenarios were standardized within the entire Phase I sample of 136 participants and then summed and averaged. The standardized Phase I DEB composite had moderate internal consistency ($\alpha = .69$), with slightly lower internal consistency for 9th grade ($\alpha = .65$) than 10th grade participants ($\alpha = .72$). To create the post-intervention (i.e., Phase II) DEB composite score, scenarios were standardized within the entire Phase II sample of 117 participants. The Phase II DEB composite had slightly improved internal consistency ($\alpha = .72$), with higher internal consistency for 9th grade participants ($\alpha = .76$) than 10th grade participants ($\alpha = .70$). The DEB scenario composites showed good convergent validity at both Phase I and Phase II. The composites were significantly negatively associated with body esteem and significantly positively associated with dieting behaviors (see Table 2). Additionally, the DEB scenario composites demonstrated good divergent validity. None of the scenarios focused on binge eating, thus it would not be expected that the DEB composite would be associated with binge eating. This was true for both Phase I and Phase II DEB composites.

Body Silhouettes. The Ideal Body Subscale (IBS-Female; Cogan, Bhalla, Sefa-Dedeh, & Rothblum, 1996) consists 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 current perceived body size, their ideal body size, and the body size they perceive to be the most attractive. Phase I responses were used to identify silhouettes that would be considered thin and heavy within the 9th and 10th grade cohorts, and these silhouettes were presented as part of the experimental paradigm (described below).

Body Satisfaction. The Body Esteem Scale for Adolescents and Adults (BESAA; Mendelson, Mendelson, & White, 2001) is a three factor (Appearance, Attribution, Weight), 23-item self-report measure assessing body esteem in individuals aged 12 years old and older. Item responses range from 0 = *never* to 4 = *always*, and an average score is computed within each subscale. The 10-item Appearance subscale assesses general feelings about appearance (e.g., "I like what I look like in pictures.", "I wish I looked better.") and has shown good internal consistency (α = .92) and test-retest reliability (r = .79). The Attribution subscale consists of five items and assesses individuals' evaluations attributed to others about their body and appearance (e.g., "My looks help me to get dates."). The Attribution subscale also has been demonstrated to have good internal consistency (α = .81) and test-retest reliability (r = .72). The third subscale, Weight, consists of eight items and assesses weight satisfaction (e.g., "I really like what I weigh.", "Weighing myself depresses me.") and has shown good internal consistency (α = .94) and test-retest reliability (r = .85). In this sample, the Appearance subscale showed good internal consistency with the overall sample (α = .90), as well as among only 9th graders (α = .90) and only 10th graders (α = .91). The Attribution subscale showed moderate internal consistency within the entire sample (i.e., all Phase I participants; α = .73), with improved internal consistency among 9th grade participants (α = .83), but poor internal consistency among the 10th grade participants (α = .60). The Weight subscale showed good internal consistency across the entire sample (α = .91) and within the 10th grade participants (α = .93). The Weight subscale was slightly less robust within the 9th grade participants (α = .88).

Thin Ideal Internalization. The Ideal-Body Stereotype Scale – Revised is a six item scale that assesses internalization of the thin body ideal (Stice & Agras, 1998). Items assess the extent to which individuals believe a thin female body is most attractive (e.g., "Slender women are more attractive."). Item responses range from 1 = *strongly disagree* to 5 = *strongly agree*, and an average scale score is computed. Higher scores suggest greater internalization of the thin body ideal. This scale has shown good internal consistency (α = .91) and a test-retest reliability of *r* = .80. The measure had good internal consistency across the entire sample (α = .87), with slightly lower alpha within 9th (α = .83) than 10th (α = .88) grade participants.

Dieting Behaviors. The Dutch Restrained Eating Scale (DRES; van Strein, Frijters, van Staveren, Defares, & Deurenberg, 1986) is a 10-item self-report measure used to assess dieting. Items assess a variety of approaches to limiting caloric intake (e.g., "Do you watch what you eat?", "How often do you try not to eat between meals because you are watching your weight?"). Item responses range from 1 = *never* to 5 = *always*, and an average scale score is computed. Higher scores indicate higher levels of reported dieting behaviors. This scale has been shown to have internal consistency (α = .95), test-retest reliability (r = .82), convergent validity with self-reported caloric intake, and predictive validity for future increases in bulimic symptoms (Stice, 2001; van Strien et al., 1986). The DRES had good internal consistency within the entire sample (α = .91), with lower alpha within 9th (α = .83) than 10th (α = .93) grade participants.

Extreme Weight Loss Behaviors. Five items adapted from the Youth Health Risk Behavior Survey (CDC, 2008) assessed the frequency of fasting, vomiting, and use of diet pills/supplements, laxatives, and diuretics (e.g., "How many times in the past 30 days did you vomit to lose weight or to keep from gaining weight?", "How many times in the past 30 days did you take any diet pills, powders, or liquids without a doctor's advice to lose weight or to keep from gaining weight?"). Items are rated in terms of behavior frequency (0 = *0*

times to 5 = *every day or almost every day*). Scores are summed, with a possible range of scores from 0-25, with higher scores indicating more frequent engagement in these behaviors. Internal consistency was low in the overall sample (α = .43); however, this was not surprising as these items were not included to measure an overarching construct. Instead, this measure provides information about the extent to which participants may be engaging in unique severe dieting behaviors.

Binge eating. The seven item Bulimia subscale of the Eating Disorder Inventory (EDI-B; Garner, Olmsted, & Polivy, 1983) was used to assess binge eating (e.g., "I stuff myself with food.", "I eat moderately in front of others and stuff myself when they're gone."). Item responses range from 1 = *never* to 6 = *always*, and are summed with a possible range of scores from 7-42. Higher scores indicate more frequent engagement bingeing behaviors. This scale has been shown to be reliable and valid in non-clinical samples (Schoemaker, van Strien, & van der Staak, 1994; α = .82). Within this sample, the EDI-B had moderate internal consistency (α = .77), with poorer internal consistency within 9th grade participants (α = .56), than within 10th grade participants (α = .80).

Body Mass Index. BMI data (i.e., height and weight without shoes or sweaters/jackets) were collected at Phase I via self-report of birth date, current height, and current weight. BMI-by-age percentiles were determined using the CDC BMI-for-age growth chart for girls aged 2-20 years old.

Popularity. A sociometric (i.e., peer-reported) assessment was conducted to obtain measures of adolescents' popularity (i.e., peer-perceived popularity/reputation-based popularity; Coie & Dodge, 1983; LaFontana & Cillessen, 1999; Parkhurst & Hopmeyer, 1998). Participants nominated an unlimited number of peers from alphabetized rosters of all students in each participants' grade level who were "most popular" and "least popular." The order of alphabetized names on this roster was counterbalanced (i.e., A - Z; Z - A) to control for possible order effects on nominee selection. A sum of the number of nominations

each adolescent receives was computed and standardized. A difference score between standardized "most popular" and "least popular" nominations was computed and re-standardized to obtain a measure of popularity (i.e., peer nominated popularity), with higher scores indicating greater popularity (Parkhurst & Hopmeyer, 1998; Prinstein & Cillessen, 2003).

Likability. Sociometric peer nominations also were conducted to obtain measures of adolescents' likeability (i.e., peer acceptance and peer rejection). Participants nominated who they "liked the most" and "liked the least" within their grade. For each nomination item, the sum of the number of nominations each adolescent received was computed and standardized within the participants' grade. 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).

Friendship nominations. A peer nomination procedure also was used to identify adolescents' participation in friendships in a manner consistent with prior research (Parker & Asher, 1993). Participants were asked to select an unlimited number of students who are their "closest friends" from the grade-wide roster and then, from this selection, to specify a "very best friend" and two additional "best friends." These friendship data were used to craft the experimental manipulations (i.e., to determine clusters of average-status and high-status peers who plausibly affiliate together), as described below.

Experimental Methods

An experimental paradigm simulating an Internet-like "chat room" that was successfully developed and tested in prior research was used in this study (Cohen & Prinstein, 2006). Participants were told that they would have an opportunity to communicate electronically via an Internet chat-room with three peers from their grade who supposedly were working on computers in other rooms throughout the school. In reality, the three

grade-mates in each participant's chat-room were preprogrammed, computer-generated electronic confederates (i.e., "e-confederates"). The electronic paradigm was elaborately programmed to appear as a functional Internet browser and "chat-room" website, and was created using the Direct RT computer program (Jarvis, 2004).

Participants were told that the purpose of the study was to understand "how adolescents communicate over the Internet." It was explained that the "chat-room" was designed to allow adolescents to communicate with one another in a specific order (Participant 1 responds first, Participant 2 responds second, and so on), in the context of answering a series of multiple choice questions. It was explained that the specific order in which participants respond to these questions is randomly determined. In actuality, the order was pre-determined to dictate that participants respond to the presented questions last. In this way, the experiment ensures that participants are first exposed to social norms before providing their own responses. For the supposed purpose of acquainting members of the chat-room with one another, participants first were asked (via computer-generated instructions) to provide some personal background information before entering the chat-room. At the background information "site," participants first entered the first name and last initial of each of their two same-gender best friends in their grade, their favorite activities, and the silhouette that they think best represents their current body size. Participants also answered questions rating their current level of self-esteem, their likelihood of engaging in specific risk behaviors, and their willingness to engage in specific risk behaviors. Participants then "logged on" to the chat-room. Once in the chat-room, participants' personal background information, including the body silhouette, was posted on screen under a graphic response window associated with their identity. Participants were able to see similar response windows associated with each of the three e-confederates. Because they have supposedly entered a virtual common area, participants believed that their response window and background information were visible to the three other chat-room members (i.e.,

the e-confederates). Background information for the participant and the three e-confederates remained on screen during participants' time in the chat-room and is thus presumably visible to all chat-room members (see Figure 1).

Although no specific identity is provided for the three e-confederates, their perceived peer status was experimentally manipulated through the presented information concerning their best friends and hobbies. Hobbies such as "hanging out alone" and "studying for school" were used to suggest lower peer status, whereas hobbies such as "watching movies" and "going to parties" were used to suggest higher peer status. Similarly, the ostensible body size of the e-confederates was experimentally manipulated via the body silhouette presented onscreen for each e-confederate. Given the ethnic composition of the sample, e-confederates were created based on data from Caucasian participants to minimize confounding of effects due to potential differences in dieting, weight, and socialization norms across ethnic groups. The average silhouette size was determined using the baseline data gathered in Phase I to identify the mode silhouette selected. The thin silhouette size was selected after considering Phase I responses of which silhouette is "most attractive" as well as which silhouette most frequently was reported as Phase I participants' "ideal" body size for Caucasian participants. Using stratified randomization based on participants' popularity and BMI, participants were randomly assigned to one of three experimental conditions: 1) thin and high status peers; 2) thin and average status peers; and 3) heavy and average status peers. The ostensible body size of the e-confederates was manipulated using body silhouettes. Across conditions, either body silhouette or peer status indicators (i.e., e-confederate friends and hobbies) were held constant to help isolate peer influence processes related to body size and/or peer status. Specifically, the same "thin" body silhouettes were presented across the thin and popular and thin and average status conditions; the same e-confederate friends and hobbies were presented across the thin and average and heavy and average status conditions.

Based on the data gathered in the initial Phase I baseline data collection, in the thin and high status peers condition each of the three e-confederates had two best friends of high popularity who attend the school at which data were collected posted under the relevant response window. In the thin and average-status, as well as the heavy and average status peer conditions, the two best friends were of average popularity. Data from the sociometric assessment allowed for the determination of first names and last initials of female grademates who had been rated by participants as either high or low average in sociometric popularity. Low average popularity was selected to maximize the popularity distinction between the highly popular and average conditions. Additionally, sociometric data on participants' likeability were examined in conjunction with their popularity status to ensure the e-confederate friends in the average condition were neither strongly liked nor disliked. Data from friendship nominations allowed for the identification of groups of high- and average-status friends for each e-confederate who actually inhabit the same peer friendships—a feature that buttressed the credibility of the experimental manipulation. This status manipulation was extremely successful in pilot work (Cohen & Prinstein, 2006).

Within the "public" chat room, participants responded to the same set of hypothetical eating risk behavior scenarios they completed in the initial Phase I survey packet (e.g., whether to engage in dieting behaviors). One scenario was presented for each response "trial." For each trial, participants once again selected from a range of non-risk and risk behaviors (labeled "a," "b," "c," etc.) the behavior that would best characterize their own response to the presented scenario. For each trial, participants responded only after they had seen the responses of each of the three e-confederates to that scenario. All e-confederate responses were viewable to participants.

After responding to the risk scenarios "publically" in the chat room, participants were introduced to a "private session" within the experiment. This "private session" was designed to assess the success of the status manipulation, as well as several theoretical constructs of

interest. Participants were told that this private session involved responding to questions while temporarily "logged off" the chat-room. In the private session, the response windows for each of the three e-confederates were removed from the display screen and participants were informed that neither their, nor the confederates' responses, would be displayed publicly in the chat-room. A manipulation check occurred and participants first were asked to rate the "popularity within their school" for each e-confederate individually (using a 7 point Likert scale), and the extent to which each e-confederate had an "ideal" body.

Debriefing. All participants were debriefed following their participation in the experimental paradigm using a thorough "funnel" post-debriefing interview. Debriefing specifically included individual discussions with participants explaining: a) the deceptive elements of the study; b) why these elements were necessary given the hypotheses under investigation; c) why it was essential to withhold this information until the end of the study; d) a request for participants not to share information regarding the study's true purpose with peers; and e) an opportunity to answer any questions. Through debriefing it was possible to identify issues regarding plausibility, as well as participants who were suspicious of the "chat room."

As part of debriefing, all participants were told that they actually were not connected to a chat room, and that the "peers" instead were computer-generated entities. Therefore, the aforementioned deceptive elements 1 (the description of our computer interface as a chat room, when it actually is not interactive with other individuals at all) and 2 (the description of other study participants as actual peers when they are actually computer-generated e-confederates) of the study was addressed directly for all participants. Participants were told that "We selected first names and last initials to list as friends of the chat room members at random. Because we needed you to believe that these might be grademates in your class, we sometimes randomly selected names that resembled the first names and last initials of other kids in your school." To explicitly counter any potential

enduring negative influence that exposure to e-confederate responses may cause, participants were told that this information represented higher levels of risk behavior than the level at which students from their school actually engage. Specifically, they were told "Although during the experiment today it appeared that peers in your grade were indicating that they would often take part in eating risk behavior, these responses actually were generated by the computer. In real life, these behaviors do not occur this frequently."

Minimizing Discussion of Study Procedures. Precautions were taken to ensure that participants did not discuss the study procedures or deceptive elements with other potential participants. This was accomplished in two ways. First, all participants were asked to sign a confidentiality agreement that assures participants that they are permitted to discuss the experiment with their parent or health care provider if necessary, but stresses the importance of maintaining confidentiality among their schoolmates regarding all aspects of the study. Second, to the extent possible, we were cognizant of adolescents' friendship networks. All adolescents were randomly assigned for participation in the experimental paradigm; however, when possible, we oversampled adolescents who had not yet had a close friend participate in the manipulation aspect of the study, as suggested by participants' friendship nominations in the sociometric assessment.

Data Analytic Plan

Sample size per condition met or exceeded the proposed 20 participants per condition. Twenty participants (6 non-Caucasian) completed the experimental paradigm in Condition 1 (i.e., popular and thin), 24 participants (6 non-Caucasian) completed the paradigm in Condition 2 (i.e., average popularity and thin), and 21 participants (7 non-Caucasian) completed the paradigm in Condition 3 (i.e., average popularity and heavy).

T-tests were conducted to examine differences among 9th and 10th grade participants on primary variables and covariates. Pearson correlations were used to examine associations among all constructs.

A 3x2 analysis of covariance (ANCOVA) was used to examine between-subject factors (i.e., high versus low popularity; thin versus heavy body type) of the three experimental conditions by grade (i.e., 9th grade, 10th grade) in regards to how participants respond to the DEB scenarios. Grade and condition were entered as fixed effects, and an interaction between experimental condition and grade were included in the model. Additionally, dummy-coded main effects to reflect membership in the three experimental conditions (e.g., thin and popular status; thin and average status; heavy and average status), grade (i.e., grade 9 or grade 10), and ethnicity (i.e., Caucasian or not), and adolescents' Phase I DEB scenario score, weight satisfaction, dieting behavior, and BMI were entered as covariates. Weight satisfaction, dieting behavior, and BMI were standardized within the analysis sample to simplify estimate interpretations. Interactions between the dummy-coded experimental conditions and grade also were included in the model. Planned contrasts were conducted to examine differences across conditions within grade, as well as differences across grade within condition.

In order to examine BMI as a moderator of disordered eating vulnerability, a regression analysis was conducted. Using participants' Phase II DEB scenario composite as a criterion measure, covariates (i.e., pre-test responses to the DEB scenarios, weight satisfaction, dieting behavior, ethnicity) were entered on an initial step of the model, followed by two dummy-coded main effects to reflect membership in the three experimental conditions (i.e., thin and popular status; thin and average status; heavy and average status e-confederates; thin and popular status condition as the comparison group) and a dummy-coded variable reflecting grade (i.e., 9th or 10th; 9th grade as the comparison group). Main effect for the centered BMI variable was entered on the third step, and all two-way interactions between dummy-coded experimental conditions, grade, and centered BMI were entered on the fourth step. The two three-way interactions between dummy-coded condition, grade, and BMI were entered on the fifth step. Significant interactions were

probed according to Aiken and West (1991) using an online calculator (Preacher, Curran, & Bauer, 2006).

A structural equation model (SEM) using maximum likelihood estimates with robust standard errors was used to verify the direction and strength of the ANCOVA findings, as well as the moderating effect of BMI. All variables and contrasts included in this model were the same as described above for the ANCOVA, with the exception of BMI, which was centered.

Results

Manipulation Check

In order to determine if the conditions were perceived by participants as intended, one-way ANOVAs were conducted to compare participants' popularity and ideal body ratings of each e-confederate in their chat room (Table 3). As expected, e-confederates were perceived as having significantly different levels of popularity and significantly different levels of body desirability across conditions. Results of post-hoc Tukey tests for multiple comparisons suggested that e-confederates in Condition 1 generally were perceived as significantly more popular than e-confederates in Conditions 2 and 3, and as having more desirable bodies than e-confederates in Condition 3. E-confederates in Conditions 2 and 3 were not rated significantly differently in terms of perceived popularity, but e-confederates in Condition 2 were rated as having significantly more desirable bodies than e-confederates in Condition 3. These findings suggest that conditions were perceived differently, and as intended, thus hypotheses were tested as described above.

Preliminary Analyses

Means and standard deviations for responses to the both the Phase I and Phase II DEB scenarios, body silhouettes, body satisfaction, thin ideal internalization, dieting behaviors, extreme weight loss behaviors, binge eating, BMI, popularity, and likeability are provided by grade and by condition in Tables 3 and 4, respectively. Independent-sample t-

tests suggested that generally there were no significant differences in primary variables and covariates across grades with two exceptions: 9th graders reported significantly higher levels of binge eating behavior and had lower levels of likeability than 10th grade participants (Table 4). One-way analysis of variance (ANVOA) suggested there were no significant differences in primary variables and covariates across conditions (Table 5).

Pearson correlations were conducted to examine associations among all study variables (Table 2). Similar patterns across 9th and 10th grade participants were observed. Phase I and Phase II DEB scenario composites were significant positively correlated over time. Phase I and Phase II DEB scenario composites generally were significantly negatively correlated with body satisfaction and significantly positively correlated with both extreme and general dieting behaviors. Higher body satisfaction was significantly negatively associated with extreme and general dieting behaviors and BMI. Similarly, extreme and general dieting behaviors were significantly positively correlated with one another. BMI and Phase I and Phase II current body shape were significantly positively associated.

Effect of Condition on Peer Influence of Endorsement of Disordered Eating Behaviors

The overall ANCOVA was significant, $F(10, 54) = 6.04$, $p < .01$, $\square^2 = .53$, suggesting the model as a whole accounts for a significant amount of the variation in experimental Phase II DEB responses. There were significant differences in group means across condition and grade, after controlling for dieting behavior, weight satisfaction, BMI, ethnicity, and pre-experimental condition DEB scores (Table 6). An overall interaction of condition by grade was observed, $F(2, 62) = 6.29$, $p < .01$ (Figure 2). The effects of grade, $F(1, 63) = 4.11$, $p = .048$, and Condition 3, $F(1, 63) = 13.62$, $p < .01$, dummy variables were significant, in addition to the interaction between the Condition 3 and grade dummy variables, $F(1, 63) = 11.18$, $p < .01$. Planned contrasts were used to examine the direction of these effects (Table 7).

SEM estimates demonstrated a similar pattern of results (Table 9). A significant interaction between Condition 3 and grade dummy variables was observed, b = 1.03, *SE* = .28, $p < .01$, after controlling for dieting behavior, weight satisfaction, BMI, ethnicity, and pre-experimental condition DEB scores. In addition, weight satisfaction emerged as a significant predictor of Phase II DEB responses such that lower weight satisfaction was associated with more maladaptive Phase II DEB responses, b = -.18, *SE* = .08, $p = .04$.

Condition effects within grade. Estimates of condition effects are provided in Table 7. The observed pattern of results partially supported hypotheses. Responses to the Phase II DEB scenarios in the experimental paradigm suggested differential peer influence effects across conditions for 9th grade participants. Although the difference between the DEB responses in Condition 1 (i.e., thin and popular) and Condition 2 (i.e., thin and average) was not statistically significant, $t(54) = -1.27$, n.s., $d = .35$, as expected, on average participants' responses were less maladaptive in the thin and average status ($M = -.09$) than in the thin and popular status condition ($M = .20$). The effect size of this contrast was small ($d = .35$), but suggestive that a difference may exist. Further, responses by participants in Condition 1, $t(54) = -3.69$, $p < .01$, $d = 1.00$, and Condition 2, $t(54) = -2.35$, $p = .02$, $d = .64$, were significantly more maladaptive than responses provided by participants in Condition 3 (i.e., heavy and average status). These findings support the hypothesis that adolescent girls exposed to heavy and average status peers would be least influenced to report willingness to engage in disordered eating behavior. For 10th grade participants there were no significant differences in responses across condition, suggesting that these participants did not experience peer influence of disordered eating behavior. The effect sizes of the contrasts, however, were small to medium, suggesting that 10th grade participants may have responded more maladaptively in Condition 3 ($M = -.04$) than Conditions 1 ($M = -.26$) and 2 ($M = -.32$) , Condition 3 versus Condition 1, $t(54) = 1.07$, n.s., $d = .29$; Condition 3 versus Condition 2, $t(54) = 1.49$, n.s., $d = .41$.

Similar findings were observed using SEM (Table 9). Among 9th grade participants, Phase II DEB responses were significantly more maladaptive in Condition 1, b = -.81, *SE* = .20, $p < .01$, and Condition 2, b = -.52, *SE* = .17, $p < .01$, than in Condition 3. There were no differences in Phase II DEB responses across condition among 10th grade participants.

Grade effects within condition. Estimates of grade effects within condition are provided in Table 7. There were significant differences in how 9th and 10th grade participants responded to the DEB scenarios in Condition 1 (i.e., thin and popular) and Condition 3 (i.e., heavy and average status). In Condition1, 9th grade participants responded significantly more maladaptively than 10th grade participants, $t(54) = -2.03$, $p=.047$, $d = .55$. In Condition 3, 10th grade participants responded significantly more maladaptively than 9th grade participants, $t(54) = 2.74$, $p =.01$, $d = .75$. These findings suggest 9th and 10th grade participants responded to the conditions differently.

SEM estimates replicated this finding (Table 9). In Condition 1, 9th grade participants responded more maladaptively to the Phase II DEB scenarios than 10th grade participants, but this results did not reach significance, b = -.46, *SE* = .24, $p = .051$. In Condition 3, 10th grade participants responded significantly more maladaptively than 9th grade participants, b = .58, *SE* = .16, $p < .01$. There was no significant difference between 9th and 10th grade participants' responses to the Phase II DEB scenarios in Condition 2.

Moderating effect of BMI

Although neither of the three-way interactions was a significant predictor of peer influence effects on disordered eating behavior in the hierarchical regression model, a significant interaction between BMI and grade was observed (Table 8). Post-hoc probing revealed that for 9th grade participants, increases in BMI significantly were associated with decreases in the maladaptiveness of Phase II DEB responses (b = -.011, $t(49) = 2.31$ $p =$ .02). For 10th grade participants, increases in BMI were associated with non-significant

increases in the maladaptiveness of Phase II DEB responses (b=.008, $t(49) = 1.89$, $p = .07$; Figure 3).

A similar pattern of results was observed using SEM (Table 9). In addition to the replication of the significant interaction between BMI and grade, a three way interaction between Condition 3, grade, and BMI was observed. Post-hoc probing revealed different patterns of interactions between grade and BMI for participants in Condition 3 versus participants not in Condition 3. For participants in Condition 3, the interaction between BMI and grade suggested that for 9th grade participants, increases in BMI significantly were associated with decreases in the maladaptiveness of Phase II DEB responses (b = -.009, $t(49) = -2.80$, $p = .007$). There was no significant association between BMI and the maladaptiveness of Phase II DEB responses for 10th grade participants (b = -.004, $t(49) = -1.01$, $p = .32$; Figure 4). For participants *not* in Condition 3, the interaction between BMI and grade replicated the results from the hierarchical linear regression. For 9th grade participants who were *not* in Condition 3, increases in BMI significantly were associated with decreases in the maladaptiveness of Phase II DEB responses (b = -.011, $t(49) = -3.03$, $p = .004$). In contrast, increases in BMI significantly were associated with increases in maladaptiveness of Phase II DEB responses for 10th grade participants *not* in Condition 3 (b = .008, $t(49) = 2.95$, $p = .005$; Figure 5).

Discussion

Adolescents are engaging in concerning levels of disordered eating behaviors and research supports the importance of peers in adolescent girls' engagement in maladaptive eating behaviors. The integration of two social psychological theories, social comparison theory (Festinger, 1954) and the prototype/willingness model (Gibbons et al., 2003), provides a framework within which previous findings can be understood and peer influence of disordered eating behavior can be tested. This study extends previous research by using a novel experimental design to examine the differential impact of social comparison on

adolescent girls' susceptibility to engage in disordered eating behavior. It was hypothesized that adolescent girls exposed to thin and popular peers reporting engagement in disordered eating behavior would report the most willingness to engage in disordered eating behavior. It was expected the strength of peer influence would significantly decrease across conditions, such that participants exposed to thin and average status peers would be less likely to report willingness to engage in disordered eating behavior, and peers exposed to heavy and average status peers would be the least likely to report willingness to engage in disordered eating behavior. Additionally, it was hypothesized that participants' own body size would moderate peer influence effects.

Results of this study suggest that peer influence is relevant to disordered eating behavior, and that peer status may amplify this process. Interestingly, 9th grade participants, but not 10th grade participants, demonstrated response patterns consistent with these hypotheses. Despite responses' being less maladaptive for 9th grade participants exposed to thin and lower average status peers than for those exposed to thin and popular status peers, this difference was not significant. This can be understood in two ways. First, it may be that with a larger sample and greater analytic power this difference would become significant. Lower average status peers were selected to ensure perceived differences in popularity across the conditions. Manipulation checks confirmed participants' perception of the intended status distinction. The effect size observed of $d = 0.35$ when comparing participants' responses in the thin and popular versus thin and average status conditions is small, but suggestive of differential peer influence. Findings trend toward 9th grade participants' responses being more maladaptive when exposed to thin and popular peers, which suggests that peers' popularity may indeed strengthen the effects of peer influence. If this trend is accurate and popularity does amplify the peer influence process associated with disordered eating behavior, the prototype/willingness model provides an accurate framework for understanding adolescents' engagement in a range of health risk behaviors. It will be

important for future research to begin examining whether the prototype/willingness model also adequately explains adolescents' engagement in prosocial and healthy behavior (e.g., healthy eating and exercise habits). Second, it could be that for this group of 9th grade adolescent girls, popularity of their peers was less important to peer influence of disordered eating behavior than the size of their peers. It may be that actual body size is the comparison factor of importance. Peers who are thin or have "ideal" bodies may convey a sense of authority with their disordered eating messages such that adolescents may believe if they engage in similar behaviors they too can be thin/have an ideal body.

In contrast, exposing 9th grade participants to heavy and average status peers suggested an anti-conformity effect. Instead of having average level responses, 9th grade participants exposed to the heavy and average status condition responded with significantly *less* maladaptive behaviors as compared both to Conditions 1 and 2, as well as compared to the sample normative average (i.e., 0), $t(54) = -4.08$, $p < .01$, $d = 1.11$, even after controlling for pre-intervention (i.e,, Phase I) responses to the DEB scenarios. Although the prototype/willingness model provides one framework for understanding why adolescents may engage in a health risk behavior (e.g., disordered eating), deviance regulation theory (Blanton, Stuart, & Van den Eijnden, 2001) suggests another way to understand why participants may have responded less maladaptively when exposed to potentially less desirable peers. Deviance regulation theory posits that individuals self-regulate on the basis of perceived social consequences of deviating from the norm. For example, Blanton et al. (2001) examined the impact of framing of health messages on behavioral intention and behavioral willingness to engage in healthy behaviors. They found that when peers made unhealthy decisions, participants were more likely to report behavioral intention and willingness to engage in healthy behaviors when health messages emphasized the desirable attributes of those who make healthy decisions. Similarly, it may be that 9th grade participants exposed to heavy and average status peers perceived a negative health

message associated with disordered eating behaviors. More specifically, the norms in the heavy and average status condition may have communicated that adolescents who engage in disordered eating behaviors are not attractive nor are they popular. This understanding of peer influence of disordered eating behavior can have important implications on new interventions. For example, combining a dissonance-based approach (e.g., Stice et al., 2008) and tailored framing of healthy eating and weight messages may allow for the flexibility to address the positive associations with thinness and weight loss (i.e., dissonance approach) as well as frame the healthy eating and weight messages according to norms within a specific peer context (i.e., deviance-regulation approach). The observed effects of peer influence suggest that a combined intervention approach of this type may be particularly effective when peer-led (e.g., Becker et al., 2006). Results from this study suggest, however, that specific types of peers may be most effective as peer leaders of such an intervention. A thin and higher status peer (i.e., higher average or popular) is likely to be the most influential when emphasizing the positive attributes of adolescent girls who engage in healthy weight behaviors.

Given that the e-confederates' statuses were comparable across the thin and average status and the heavy and average status conditions, overall results from the 9th grade participants support the idea that social comparison of body size also is an important factor for peer influence processes. Indeed, 9th grade participants with lower BMI responded significantly more maladaptively to the experimental Phase II DEB scenarios than comparable 10th grade participants. In contrast, there was no significant difference between response patterns of 9th or 10th grader participants with higher BMI. This further suggests that social comparison of body size may be particularly salient to the 9th grade participants. It would be important to confirm this by repeating this study and including a heavy and unpopular condition. If body size is the most important factor in peer influence of disordered eating behavior, no significant differences between the heavy and average status and heavy

and unpopular status conditions should be observed. If both social comparison of body size and popularity status are important, the heavy and unpopular status condition should result in less peer influence, compared to the heavy and average status condition.

Contrary to hypotheses, 10th grade participants did not demonstrate any significant differences across conditions, suggesting significant cohort effects of peer influence of disordered eating behaviors. Interestingly, there was an anti-conformity effect observed in the thin and average condition, $t(54) = -2.55$, $p < .05$, $d = .69$, and a trend toward this response pattern in the thin and popular condition, $t(54) = -1.77$, $p = .08$, $d = .48$. Participants in the thin body conditions reported less maladaptive responses to the DEB scenarios. For the 10th grade participants, being exposed to a thin peer engaging in disordered eating behavior appears to have provoked healthier behavioral responses. This does not mean, however, that 10th grade participants were less willing to engage in disordered eating behavior than the 9th grade participants. In fact, the pre-programmed responses to the DEB scenarios in the experimental paradigm were virtually identical across the 9th and 10th grade cohorts. These responses were based on the Phase I DEB scenario data and were selected by choosing behaviors that were 1) one standard deviation more maladaptive than the majority of the sample and 2) actually reported by participants. In an unusual circumstance, there was one obese, popular, Caucasian female in the 10th grade. It may be the presence of this popular obese adolescent girl altered the thinness norms and body expectations among the 10th graders such that public displays of disordered eating behavior are not acceptable. The interaction between adolescents' own BMI and grade supports this possibility as BMI did not appear to affect 10th grade participants' responses to the Phase II DEB scenarios. The lack of peer influence and unexpected anti-conformity effects among the 10th grade participants suggests that interventions cannot be general; interventions need to be adapted for each cohort of adolescents, in each context. Similar to individual differences observed across adolescents, it appears that cohorts within this

particular high school are different in respect to their norms governing disordered eating attitudes and behavior. Although there were not enough heavy popular adolescent girls to include a heavy and popular condition, it is plausible the obese popular adolescent is particularly influential among the 10th graders. Future research should explore which peers adolescents perceive to be most salient and influential, and then experimentally test whether peers with similar characteristics invoke a peer influence process for risky, as well as healthy, behaviors. Given that peers perceived as salient and influential may vary by risk factor, it would be important to gather data about health risk behaviors individually.

Importantly, the sample included in this study was predominantly Caucasian and all study manipulations were created using data from Caucasian participants. This was done to ensure results would be as interpretable as possible. Research examining disordered eating among ethnic groups produces mixed findings. One meta-analysis suggested that Black high school students reported comparable levels of disordered eating behavior as their Caucasian counterparts (Wildes, Emery, & Simons, 2001), whereas Croll et al. (2002) found that Hispanic and Native American Indian adolescent girls reported higher levels of disordered eating behavior than Caucasian adolescent females, and that Black adolescent girls reported the least disordered eating behavior. Further complicating this area of research is the possibility that ethnic minorities' exposure and acculturation to the thinness ideal may change their risk of disordered eating behavior. For example, Abrams and Stormer (2002) found that African-American adolescent girls with ethnically heterogeneous peer groups had higher awareness and internalization of the thin ideal as compared to African-American girls with homogenous peer groups. Gowan, et al. (1999) observed that acculturation to American culture was associated with higher prevalence of partial syndrome eating disorders in Hispanic adolescent females than Asian or European American girls. Given potential differences in patterns of disordered eating behaviors and body ideals, it will be important for future research to examine peer influence effects of disordered eating

behaviors within different ethnic groups, as well as across these groups. The high school in which the data for this study were gathered is relatively ethnically diverse, which may impact who is perceived as popular, as well as who is influential. It may be that within each ethnic group there is a peer hierarchy, and individuals are the most influenced by same-ethnicity popular peers who are more likely to have similar body ideals. On the other hand, having a range of ethnicities among the popular peers may mitigate peer influence of disordered eating behavior if there is a range of body ideals among those individuals. Although there was not enough power to examine differences in response patterns between Caucasian and non-white participants, an examination of the means of the non-white participants across conditions and grade suggested similar trends (Table 10). Clearly, future research is needed to understand both within- and cross-ethnicity influence of disordered eating behaviors among adolescent females.

Notably, the sample of participants included in this analysis only was a subsample of the overall sample of participants. There are a number of differences across the Phase I, Phase II, and final analysis samples. First, the Phase II and final analysis samples include higher percentages of participants of a healthy weight than the original Phase I sample (approximately 74% and 74% versus 56%). The participants who completed Phase II and the subsample used in the final analysis also reported less maladaptively on the DEB scenarios. This suggests the Phase II sample may over represent peer influence of disordered eating behavior on healthy weight adolescent girls who have relatively healthy eating attitudes. Second, although there were few significant differences across covariates, the Phase II participants who were not included in the final sample for analysis generally reported more disordered eating attitudes and behaviors, including more maladaptive responses to the DEB scenarios. Third, the majority of participants excluded from the final analysis sample were 9th grade participants. It is possible that the exclusion of the participants with more maladaptive attitudes and behavioral responses attenuated the

results of this study, particularly within the 9th grade cohort. It also is possible that adolescent girls who feel worse about their bodies and are more willing to engage in disordered eating behaviors are more susceptible to peer influence, regardless of peers' characteristics. More specifically, inclusion of these participants, particularly the 9th grade adolescents, could eliminate observed peer influence differences across conditions. It is important to recognize that the results of this study may represent patterns of peer influence of disordered eating behaviors on relatively healthy adolescent girls. Replication of this study with adolescent girls who report a broad range of eating attitudes and body mass is needed to increase the generalizability of the findings.

In addition to learning more about which peers may be most influential to adolescent girls' disordered eating behavior, school settings should also be considered in future research. The current data were collected at a high school located in a rural setting. It may be that adolescents attending rural high schools are less connected to their school peers than adolescents in urban or suburban settings. Adolescents living in rural areas may only have access to their classmates at school and may have developed influential friendships outside the school setting. If this is true, social comparison of any risk behavior with peers from school is unlikely to be salient. In contrast, adolescent girls attending an urban or suburban high school may have more opportunities to develop further their school-based friendships, and thus may be more influenced by school-based peers. Further, adolescent girls attending high schools in areas of high socioeconomic status may experience peer influence of the thinness norm differently. Higher socioeconomic status may be associated with greater appearance awareness, which may, in turn, impact the importance placed on disordered eating behaviors more generally. Lastly, peer influence of disordered eating behavior may occur differently across mixed-gender and all-female high schools. It is possible that all-female high schools could be protective or a risk factor for disordered eating behaviors. Peer influence of disordered eating behaviors should be explored in other school

settings to ascertain whether the cohort effects observed in this study can be generalized to other high schools, or if school setting may moderate the peer influence process.

This study contributes to the peer influence literature in four ways. First, this study used a novel experimental paradigm to test peer influence hypotheses. Although there is a large literature supporting peer influence of a variety of behaviors among adolescence, only one study has used an experimental design to examine specific peer influence processes (Cohen & Prinstein, 2006). Cohen and Prinstein (2006) explored the role of popularity in peer influence of aggression. The current investigation extends this research by examining a different population (i.e., adolescent girls), integrating multiple social psychology theories (i.e., social comparison and prototype/willingness models) and considering adolescents' willingness to engage in maladaptive behaviors (i.e., disordered eating behavior) that can have negative long-term consequences. Second, this study used a multidisciplinary approach by integrating developmental, social, health, and clinical psychology literatures. Peer influence is inherently a multidisciplinary field; however, it is rare for peer influence studies to have strong theoretical bases. This study was developed and implemented using the framework of two important social psychological theories (i.e., social comparison and the prototype/willingness model), within the context of developmental, health, and clinical psychology research. Third, the disordered eating behavior scenarios were developed based on focus groups with adolescent females. These scenarios were created to reflect situations, behaviors, and attitudes related to body image and dieting experienced by adolescent girls. Instead of asking participants to complete a self-report behavior inventory about dieting behavior, the scenarios provided an innovative way to measure willingness to engage in disordered eating behavior by offering a realistic context for the behavior and potentially more accurate responses. Fourth, this research captured peer influence processes during an important developmental transition. Participants were 9th and 10th grade adolescent females, and thus at a time period during which peers and body are

particularly salient. The participant pool allowed for examination of potential developmental differences (i.e., 9th versus 10th grade participants) as well as the possibility to consider contextual differences (e.g., varying characteristics of popular peers) related to peer influence of disordered eating behavior.

There are a number of limitations of this study that provide opportunities for future research. First, as previously mentioned, ethnicity should be considered. The sample used in this research did not provide sufficient power to determine if Caucasian and non-Caucasian adolescent girls respond similarly to peer influence of disordered eating behavior. It would be important to explore whether the same peers are influential across ethnic groups and if there are differences across ethnic groups more broadly (e.g., Do African-American and Latina adolescent girls respond similarly to peer influence?). Second, as discussed, the role of school setting should be explored. The results of this study only can be generalized to the high school within which it was conducted, but it may be that peer influence process of disordered eating behavior are different across rural, suburban, and urban settings. For example, peer influence of disordered eating behaviors may occur at different levels at schools with higher socioeconomic status compared to schools of lower socioeconomic status. Although this research focused on potential risks of disordered eating behavior, it would be helpful to consider whether school diversity may protect adolescent girls against peer influence of disordered eating behavior. Third, it may be that peer influence changes over the course of adolescence. This research, however, only captured potential peer influence processes in early adolescents. Previous experimental studies examining body dissatisfaction and exercise behavior used college women. Peer influence of disordered eating behaviors may also exist among older adolescents, thus it would be important to examine experimental outcomes across the high school years. Replicating this study in a high school with cohorts from all four grades would help elucidate whether age differences, cohort differences, or both are related to peer influence of

disordered eating behavior. Fourth, this study was cross-sectional. It did not allow for examination of the long-term impact of a prototype (i.e., e-confederate) on adolescent girls' disordered eating behavior. Fifth, as previously mentioned, this research used a risk factor framework. The experimental paradigm also can be used to consider possible protective factors. For example, results from the 10th grade participants suggest the presence of a highly visible peer who deviates from disordered eating behavior norms may alter the peer influence process. It may be that the presence of an "ally" would attenuate peer influence of disordered eating behavior. Asch's (1955) studies suggest the inclusion of an e-confederate who does not report willingness to engage in disordered eating behavior may eliminate the peer influence. Additionally, clarifying what type of ally is most effective would have important implications both for understanding risk as well as informing peer-led intervention efforts. E-confederate allies could be created to be similar to the other e-confederates (i.e., thin and popular within the thin and popular condition), dissimilar in size (i.e., heavy and popular within the thin and popular condition), dissimilar in status (i.e., thin and average status), or dissimilar in both (i.e., heavy and average status). Sixth, although the popularity of the prototype (i.e., e-confederate) was incorporated into the experimental design, adolescents' own popularity was not considered as part of the theoretical model. It may be that adolescent girls' desire for popularity moderates peer influence of disordered eating behaviors. Being of high popularity may be protective, or it could be that indifference to popularity status is the protective factor against peer influence processes. Although stratified randomization was used to ensure a range of popularity across conditions, it would be worthwhile to test the association between adolescents' own popularity, as well as their desire to be popular, and responses to the experimental conditions. Seventh, this study did not examine the role of self-esteem in the peer influence process. Self-esteem and contingencies of self-worth also may moderate adolescent girls' susceptibility to peer influence of disordered eating behavior. For those adolescent girls who do not feel good

about themselves, or for whom appearance and body are central to their identity, peer influence of disordered eating behaviors may be amplified. Eight, the psychometrics of the DEB scenarios should be examined further. For example, the DEB scenarios may not be applicable across 9th to 12th grade adolescent girls. The behaviors also may vary across schools and school locations, as well as across ethnic groups. It will be important for future research to examine the external validity of the DEB scenarios and expand them to include other scenarios that might be relevant, particularly for non-Caucasian adolescent girls.

Overall, results suggest that thin peers may be the most salient messengers of disordered eating behaviors among adolescent girls, and that popularity may amplify the peer influence process. Importantly, cohort effects of both conformity and anti-conformity were observed, suggesting that intervention efforts need to be tailored to the local norms within each peer context, and that peer-led efforts may be a particularly useful intervention method. Replication is needed to examine the generalization of the observed cohort effects, and future research should explore differences across ethnicities, school settings, and age, as well as potential moderators of peer influence of disordered eating behaviors such as the presence of an "ally," participants' own popularity status, self-esteem, and contingencies of self-worth.

Table 1

Means (and standard deviations) for Primary Variables and Covariates of Participants with Missing and Non-Missing Covariate Data

	Participants Not Missing Data	Participants Missing Data	*t*
Phase I Measures			
Disordered Eating Behavior Scenarios	-.14 (.51)	.14 (.69)	*t*(111) = -2.51*
Body Esteem – Appearance[+]	2.66 (.74)	2.38 (1.19)	*t*(16) = .86
Body Esteem – Weight Satisfaction	2.70 (.87)	1.97 (1.17)	*t*(79) = 2.80**
Body Esteem – Attribution	1.93 (.69)	2.21 (.69)	*t*(76) = -1.33
Extreme Weight Loss Behaviors	.20 (.75)	.41 (1.00)	*t*(80) = -.96
Dieting Behaviors[+]	17.71 (7.04)	23.53(11.51)	*t*(16) = -1.88
Thin Ideal Internalization	3.36 (.70)	3.04 (.91)	*t*(79) = 1.55
Binge Eating	36.75 (4.54)	35.57 (6.56)	*t*(77) = .81
Current Body Size Silhouette	5.06 (1.42)	5.55 (1.45)	*t*(101) = -1.68
Body Mass Index – Percentile	52.78 (30.58)	60.99(29.32)	*t*(86) = -1.12
Popularity	.11 (1.37)	.14 (.85)	*t*(111) = -.15
Likeability	.14 (1.12)	.22 (.98)	*t*(111) = -.38
Phase II Measures			
Current Body Size Silhouette	4.85 (1.18)	5.15 (1.27)	*t*(111) = -1.29
Disordered Eating Behavior Scenarios	-.20 (.62)	.26 (.62)	*t*(111) = -3.92**

[+] = unequal variances across groups

* $p < .05$, ** $p < .01$

Table 2

Correlations Among Primary Variables and Covariates by Grade

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Phase I Measures														
1. DEB Scenarios	-	-.49**	-.61**	-.21	.45*	.71**	.21	-.24	.17	.20	-.15	-.09	.22	.55**
2. Body Esteem – Appearance	-.39*	-	.73**	.54**	-.62**	-.33	-.24	.13	-.39*	-.37	.02	.11	-.24	-.34
3. Body Esteem – Weight Satisfaction	-.48**	.72**	-	.44*	-.69**	-.56**	-.08	.51**	-.61**	-.58**	.32	.11	-.52**	-.41*
4. Body Esteem – Attribution	-.17	.23	.38*	-	-.29	-.12	.13	.03	-.28	-.31	.50**	-.18	-.16	.11
5. Extreme Weight Loss Behaviors	.37*	-.33	-.34*	-.05	-	.35	.08	-.26	.31	.28	-.03	.00	.30	.48**
6. Dieting Behaviors	.59**	-.54**	-.58**	-.15	.67**	-	-.02	-.45*	.29	.32	-.09	-.01	.28	.41*
7. Thin Ideal Internalization	.39*	-.24	-.19	.28	.16	.02	-	.11	-.28	-.39*	.38*	.00	-.32	.24
8. Binge Eating	-.00	.37*	.06	-.26	-.25	-.03	-.34*	-	-.28	-.14	.08	-.15	-.34	-.30
9. Current Body Size Silhouette	.28	.12	-.40*	-.29	.18	.23	.11	.24	-	.81**	-.40*	-.21	.73**	-.03
10. Body Mass Index – Percentile	.02	.00	-.43**	-.39*	.15	.19	-.10	.21	.69**	-	-.47*	-.19	.69**	-.15
11. Popularity	-.13	-.05	.09	.23	-.27	-.23	.29	-.38*	-.12	-.13	-	-.19	-.28	.25
12. Likeability	-.26	.31	.26	-.17	-.23	-.12	-.32	.46**	-.13	.08	.15	-	-.14	-.10
Phase II Outcome Measure														
13. Current Body Size Silhouette	.23	.04	-.40*	-.17	.21	.32	.00	.18	.65**	.61**	-.37*	-.07	-	.16
14. DEB Scenarios	.58**	-.30	-.56**	-.27	-.01	.38*	.00	.07	.39*	.33*	-.31	-.22	.49**	-

Note. Correlations of primary variables among 9th grade girls presented above the diagonal, and correlations of primary variables among 10th grade girls are presented below the diagonal. For all scale, higher scores are indicative of more extreme responding in the direction of the construct assessed. DEB = Disordered Eating Behavior.

* = $p < .05$ ** = $p < .01$

Table 3

Means (and standard deviations) for Popularity and Ideal Body Ratings of E-Confederates Across Conditions

	Thin & Popular	Thin & Average	Heavy & Average	*F* (2, 62)
Popularity				
Person 1	3.30 (1.42)[a]	4.29 (1.04)[b]	4.62 (1.20)[b]	6.51**
Person 2	3.45 (1.43)[a]	4.33 (1.09)[a,b]	4.81 (1.37)[b]	5.23**
Person 3	3.25 (1.12)[a]	5.13 (1.45)[b]	5.38 (1.28)[b]	16.43**
Ideal Body Ratings				
Person 1[+]	2.70 (1.72)[a]	3.75 (.90)[b]	4.90 (1.04)[c]	16.03**
Person 2[+]	3.00 (1.84)[a]	3.54 (.88)[a]	4.90 (1.04)[b]	11.96**
Person 3	4.15 (1.27)[a]	4.46 (1.59)[a]	5.76 (1.22)[b]	8.04**

Note. For all scales, lower ratings are indicative of higher levels of the construct assessed. Means in each row that share superscripts do not differ significantly.

[+] = unequal variances across conditions

* $p < .05$, ** $p < .01$

Table 4

Means (and standard deviations) for Primary Variables and Covariates Across Grades

	9th Graders	10th Graders	*t*
Phase I Measures			
Disordered Eating Behavior Scenarios	-.24 (.46)	-.07 (.55)	*t*(63) = -1.36
Body Esteem – Appearance	2.66 (.80)	2.66 (.72)	*t*(63) = .00
Body Esteem – Weight Satisfaction	2.81 (.82)	2.62 (.91)	*t*(63) =.86
Body Esteem – Attribution	1.87 (.81)	1.97 (.59)	*t*(63) = -.58
Extreme Weight Loss Behaviors	.18 (.77)	.22 (.75)	*t*(63) = -.20
Dieting Behaviors+	16.07 (4.99)	18.95 (8.11)	*t*(60) = -1.76
Thin Ideal Internalization	3.25 (.65)	3.44 (.73)	*t*(63) = -1.12
Binge Eating	38.14 (2.69)	35.70 (5.34)	*t*(63) = 2.21*
Current Body Size Silhouette	4.98 (1.40)	5.12 (1.45)	*t*(63) = -.39
Body Mass Index – Percentile	52.37 (29.89)	53.09(31.50)	*t*(63) =-.09
Popularity	-.06 (1.30)	.24 (1.43)	*t*(63) = -.86
Likeability	-.34 (1.02)	.50 (1.06)	*t*(63) = -3.24**
Phase II Measures			
Current Body Size Silhouette	4.71 (1.01)	4.95 (1.29)	*t*(63) = -.78
Disordered Eating Behavior Scenarios	-.25 (.64)	-.17 (.61)	*t*(63) = -.50

+ = unequal variances across grades; * $p < .05$, ** $p < .01$

Table 5

Means (and standard deviations) for Primary Variables and Covariates Across Conditions

	Thin & Popular	Thin & Average	Heavy & Average	*F*
Phase I Measures				
Disordered Eating Behavior Scenarios	-.20 (.46)	-.08 (.59)	-.16 (.48)	F(2, 62) = .34
Body Esteem -- Appearance	2.94 (.64)	2.53 (.83)	2.53 (.69)	F(2, 62) = 2.16
Body Esteem – Weight Satisfaction	2.96 (.80)	2.50 (.95)	2.68 (.80)	F(2, 62) = 1.57
Body Esteem – Attribution^{+}	2.12 (.69)	1.82 (.84)	1.87 (.47)	F(2, 62) = 1.12
Extreme Weight Loss Behaviors^{+}	.20 (.52)	.33 (1.13)	.05 (.22)	F(2, 62) = .80
Dieting Behaviors	17.00(7.15)	18.79(7.87)	17.14(6.04)	F(2, 62) = .45
Thin Ideal Internalization	3.35 (.78)	3.36 (.70)	3.36 (.64)	F(2, 62) = .00
Binge Eating	37.85 (2.58)	35.54(6.09)	37.10(3.73)	F(2, 62) = 1.52
Current Body Size Silhouette	4.90 (1.36)	5.35(1.52)	4.88(1.36)	F(2, 62) = .81
Body Mass Index – Percentile	48.04 (32.47)	56.75(32.35)	52.77(27.32)	F(2, 62) = .44
Popularity	.28 (1.28)	.08(1.43)	-.01(1.44)	F(2, 62) = .23
Likeability^{+}	.27 (1.49)	.11 (.99)	.05 (.86)	F(2, 62) = .20
Phase II Measures				
Current Silhouette	4.85 (.99)	4.88(1.30)	4.81(1.25)	F(2, 62) = .02
Disordered Eating Behavior Scenarios	-.13 (.55)	-.17 (.67)	-.31 (.64)	F(2, 62) = .50

Note. Means and standard deviations of variables across condition also were examined within grade. The same pattern of results emerged such that there were no significant differences across conditions in either grade. The one exception was there were significant differences in the means and standard deviations in the Phase II Disordered Eating Behavior scenario responses for 9th grade participants. These differences were explored in the ANCOVA. * $p < .05$, + = unequal variances across groups

Table 6

ANCOVA Estimates of Condition by Grade on Experimental Disordered Eating Behavior Scenario Responses

	F(1,63)	*p*	partial η^2
Overall Model	***F*(10, 54) = 6.04**	**.00**	**η^2=.53**
Contrast: Condition by grade	***F*(2,62) = 6.23**	**.00**	**.19**
Phase I DEB Scenarios	**8.67**	**.00**	**.14**
Grade (dummy variable)	**4.11**	**.048**	**.07**
Condition 2 (dummy variable)	1.62	.21	.03
Condition 3 (dummy variable)	**13.62**	**.00**	**.20**
Dieting Behavior	.04	.84	.00
Weight Satisfaction	3.82	.06	.07
BMI	.15	.70	.00
Ethnicity (dummy variable)	.01	.93	.00
Condition 2 x grade	.61	.44	.01
Condition 3 x grade	**11.18**	**.00**	**.17**

Note. Significant parameter estimates are in boldface. Partial η^2 represents the unique proportion of variance accounted for by each variable. Dieting behavior, weight satisfaction, and BMI were standardized.

Table 7

Contrasts of Condition and Grade for Experimental Disordered Eating Behavior Scenario Responses

	M (SE)	*M (SE)*	*t* (54)	*p*	*d*
9th Grade					
Condition 2 versus Condition 1	-.09 (.16)	.20 (.16)	-1.27	.21	.35
Condition 3 versus Condition 1	**-.61 (.15)**	**.20 (.16)**	**-3.69**	**.00**	**1.00**
Condition 3 versus Condition 2	**-.61 (.15)**	**-.09 (.16)**	**-2.35**	**.02**	**.64**
10th Grade					
Condition 2 versus Condition 1	-.32 (.12)	-.26 (.15)	-0.33	.74	.09
Condition 3 versus Condition 1	-.04 (.14)	-.26 (.15)	1.07	.29	.29
Condition 3 versus Condition 2	-.04 (.14)	-.32 (.12)	1.49	.14	.41
Condition 1					
10th versus 9th grade	**-.26 (.15)**	**.20 (.16)**	**-2.03**	**.048**	**.55**
Condition 2					
10th versus 9th grade	-.32 (.12)	-.09 (.16)	-1.08	.28	.29
Condition 3					
10th versus 9th grade	**-.04 (.14)**	**-.61 (.15)**	**2.74**	**.01**	**.75**

Note. Condition 1 refers to exposure to thin and popular status peers. Condition 2 refers to exposure to thin and average status peers. Condition 3 refers to exposure to heavy and average status peers. Adjusted means and their standard errors are listed in this table. *d* = Cohen's *d* for estimating effect size. Small effects size = .20; medium effect size = .50; large effect size = .80. Significant parameter estimates are in boldface.

Table 8

Hierarchical Linear Regression Examining Moderation of BMI on Experimental Disordered Eating Behavior Scenario Responses

	Phase II Disordered Eating Behavior Scenarios			
Step and predictors	ΔR^2	β at Step	Final β	*p*
Step 1	.39**			
Phase I DEB Scenarios		**.50**	**.46**	**.00**
Dieting Behavior		-.10	-.11	.39
Weight Satisfaction		-.26	-.25	.07
Ethnicity		-.11	-.06	.56
Step 2	.03			
Condition 2 (dummy variable)		-.15	-.12	.49
Condition 3 (dummy variable)		**-.21**	**-.54**	**.00**
Grade (dummy variable)		.00	-.24	.17
Step 3	.00			
BMI		**-.05**	**-.56**	**.02**
Step 4	.21**			
Condition 2 x BMI		.08	.32	.16
Condition 3 x BMI		-.16	.04	.82
Condition 2 x Grade		.09	.07	.73
Condition 3 x Grade		**.61**	**.56**	**.00**
BMI x Grade		**.41**	**.74**	**.00**
Step 5	.02			
Condition 2 x Grade X BMI			-.32	.17
Condition 3 x Grade X BMI			-.26	.13
Total R^2	.65**			

Note. Condition 1 refers to exposure to thin and popular status peers. Condition 2 refers to thin and average status peers. Condition 3 refers to heavy and average status peers. DEB = Disordered eating behavior; BMI = Body Mass Index Percentile. Dieting behavior and weight satisfaction were standardized; BMI was centered. Significant parameter estimates are in boldface. * $p < .05$; ** $p < .01$

Table 9

Unstandardized and Standardized Estimates (and Standard Errors) of Experimental Disordered Eating Behavior Scenario Responses from the Structural Equation Model

	Phase II Disordered Eating Behavior Scenarios		
Parameter Estimate	B (*SE)*	β (*SE)*	*p*
Measurement Model Estimates			
Phase I DEB Scenarios	**.55 (.13)**	**.46 (.10)**	**.00**
Dieting Behavior	-.07 (.08)	-.11 (.14)	.41
Weight Satisfaction	**-.15 (.07)**	**-.25 (.11)**	**.03**
Ethnicity	-.08 (.13)	-.06 (.10)	.52
Condition 2 (dummy variable)	-.15 (.15)	-.12 (.12)	.32
Condition 3 (dummy variable)	**-.71 (.14)**	**-.54 (.11)**	**.00**
Grade (dummy variable)	-.30 (.18)	-.24 (.15)	.11
BMI	**-.01 (.00)**	**-.56 (.17)**	**.00**
Condition 2 x BMI	.01 (.01)	.32 (.16)	.05
Condition 3 x BMI	.00 (.01)	.04 (.12)	.74
Condition 2 x Grade	.10 (.23)	.07 (.16)	.67
Condition 3 x Grade	**.93 (.24)**	**.56 (.16)**	**.00**
BMI x Grade	**.02 (.01)**	**.74 (.18)**	**.00**
Condition 2 x Grade X BMI	-.01 (.01)	-.32 (.18)	.07
Condition 3 x Grade X BMI	**-.01 (.01)**	**-.26 (.12)**	**.03**
Contrasts			
Grade 9: Condition 2 versus Condition 1	-.15 (.15)		.32
Grade 9: Condition 3 versus Condition 1	**-.71 (.14)**		**.00**
Grade 9: Condition 3 versus Condition 2	**-.56 (.13)**		**.00**
Grade 10: Condition 2 versus Condition 1	-.06 (.16)		.73
Grade 10: Condition 3 versus Condition 1	.21 (.18)		.23
Grade 10: Condition 3 versus Condition 2	.27 (.16)		.09
Condition 1: Grade 10 versus Grade 9	-.30 (.18)		.10
Condition 2: Grade 10 versus Grade 9	-.20 (.15)		.17
Condition 3: Grade 10 versus Grade 9	**.63 (.15)**		**.00**

Note. No χ^2 is provided because it is a completely identified model. Condition 1 refers to exposure to thin and popular status peers. Condition 2 refers to thin and average status peers. Condition 3 refers to heavy and average status peers. DEB = Disordered eating behavior; BMI = Body Mass Index Percentile. Dieting behavior and weight satisfaction were standardized; BMI was centered. Significant parameter estimates are in boldface.

Table 10

Adjusted Means and Standard Errors of Condition by Grade of Non-Caucasian Participants for Experimental Disordered Eating Behavior Scenario Responses

	M (SE)
9th Grade	
Condition 1	.21 (.17)
Condition 2	-.08 (.18)
Condition 3	-.60 (.18)
10th Grade	
Condition 1	-.25 (.20)
Condition 2	-.31 (.18)
Condition 3	-.03 (.17)

Note. Condition 1 refers to exposure to thin and popular status peers. Condition 2 refers to exposure to thin and average status peers. Condition 3 refers to exposure to heavy and average status peers. Adjusted means and their standard errors are listed in this table.

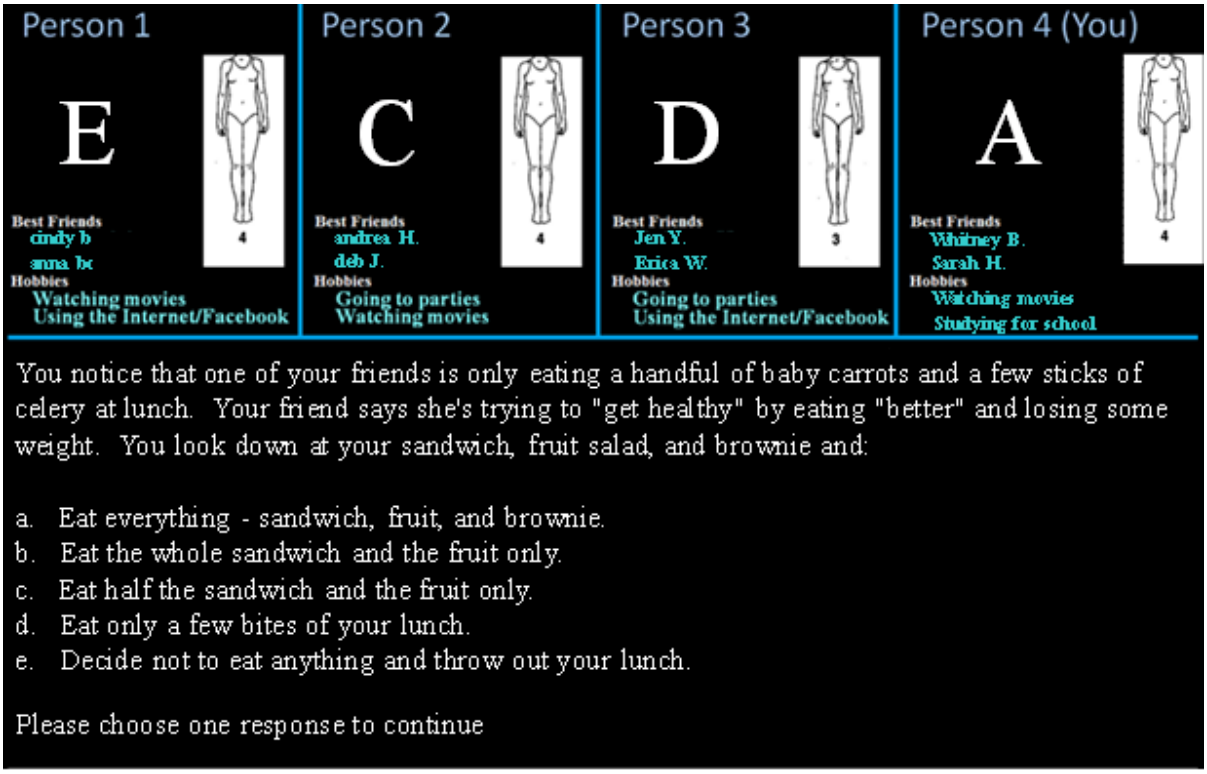

Figure 1. Example screen seen by participants in the experimental portion of the study. This example screen is representative of what participants in either the thin and popular status condition or thin and average status condition saw. Popularity status was manipulated via the names presented as well as the hobbies displayed for the e-confederates.

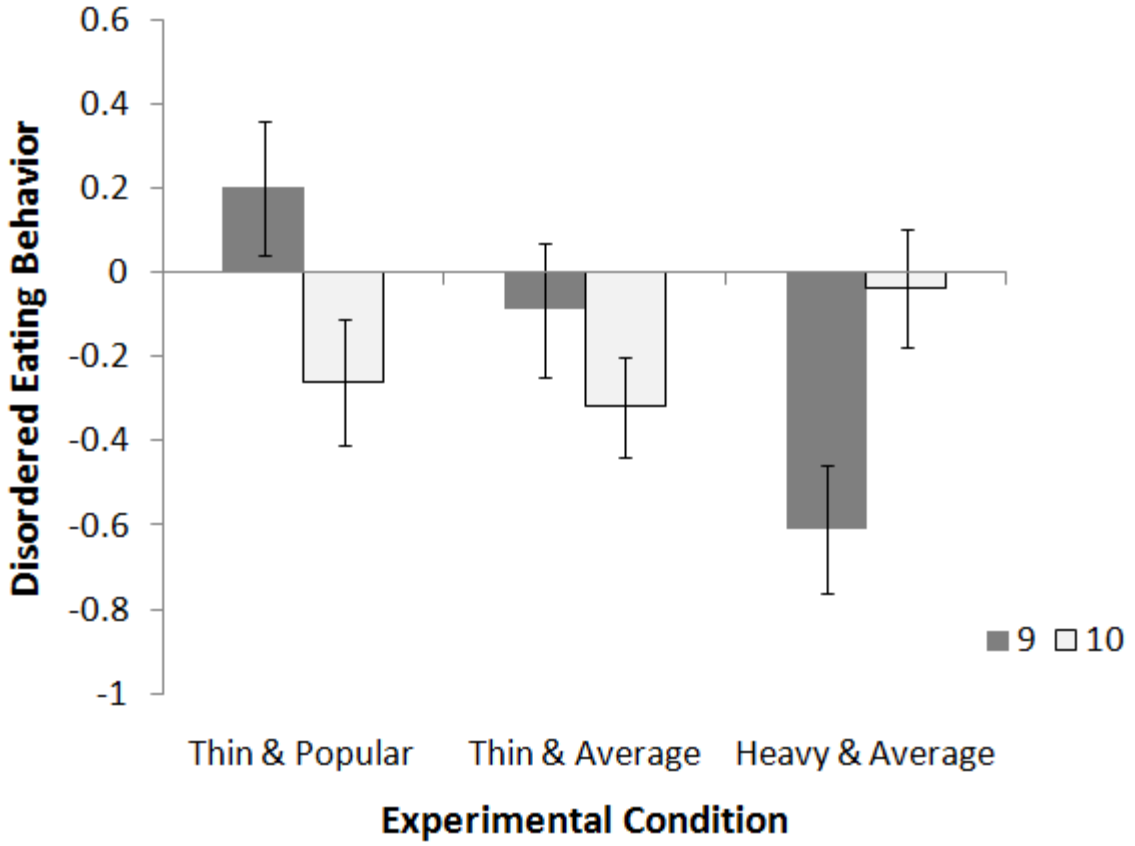

Figure 2. Adjusted mean values of responses to the experimental disordered eating scenarios by grade and condition. No differences were found across conditions for the 10th grade participants. There was no significant difference between mean responses in the thin and popular and thin and average conditions for the 9th grade participants. A significant difference in mean responses was observed between the thin and popular and thin and average conditions and the heavy and average condition for the 9th grade participants. The adjusted mean value for the 9th grade participants' responses in the heavy and average status condition, $t(54) = -4.08$, $p < .01$, $d = 1.11$, and the adjusted mean value for the 10th grade participants' responses in the thin and average condition, $t(54) = -2.55$, $p < .05$, $d = .69$, also are significantly different from the average normative response (i.e., 0). Standard errors are represented by the error bars on each column.

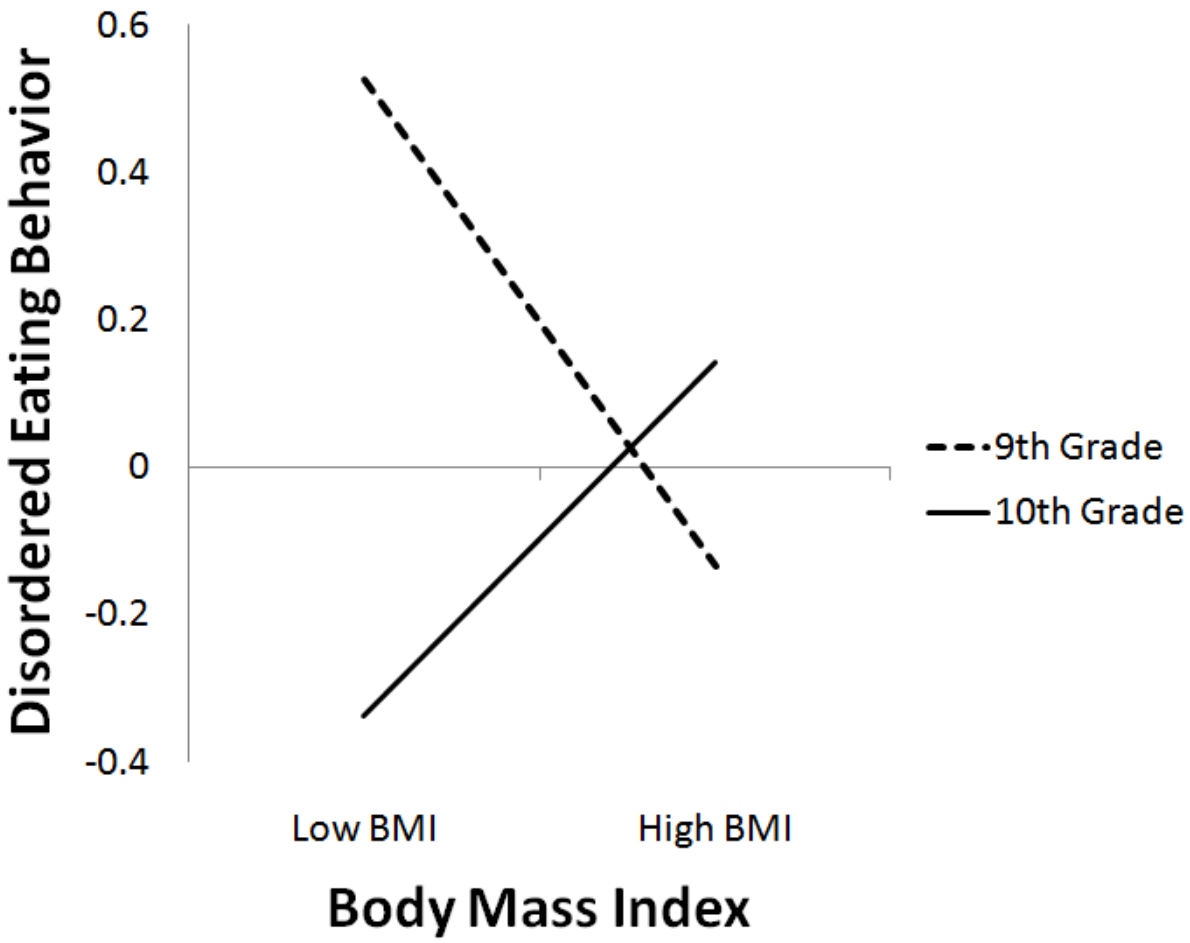

Figure 3. Moderation of the association between body mass index (BMI) and experimental disordered eating scenario responses (DEB) by grade. Controlling for pre-intervention (i.e., Phase I) DEB responses, increases in BMI were associated with significantly less maladaptive Phase II DEB responses for 9th grade participants. For 10th grade participants, increases in BMI were associated with non-significant increases in the maladaptiveness of Phase II DEB responses.

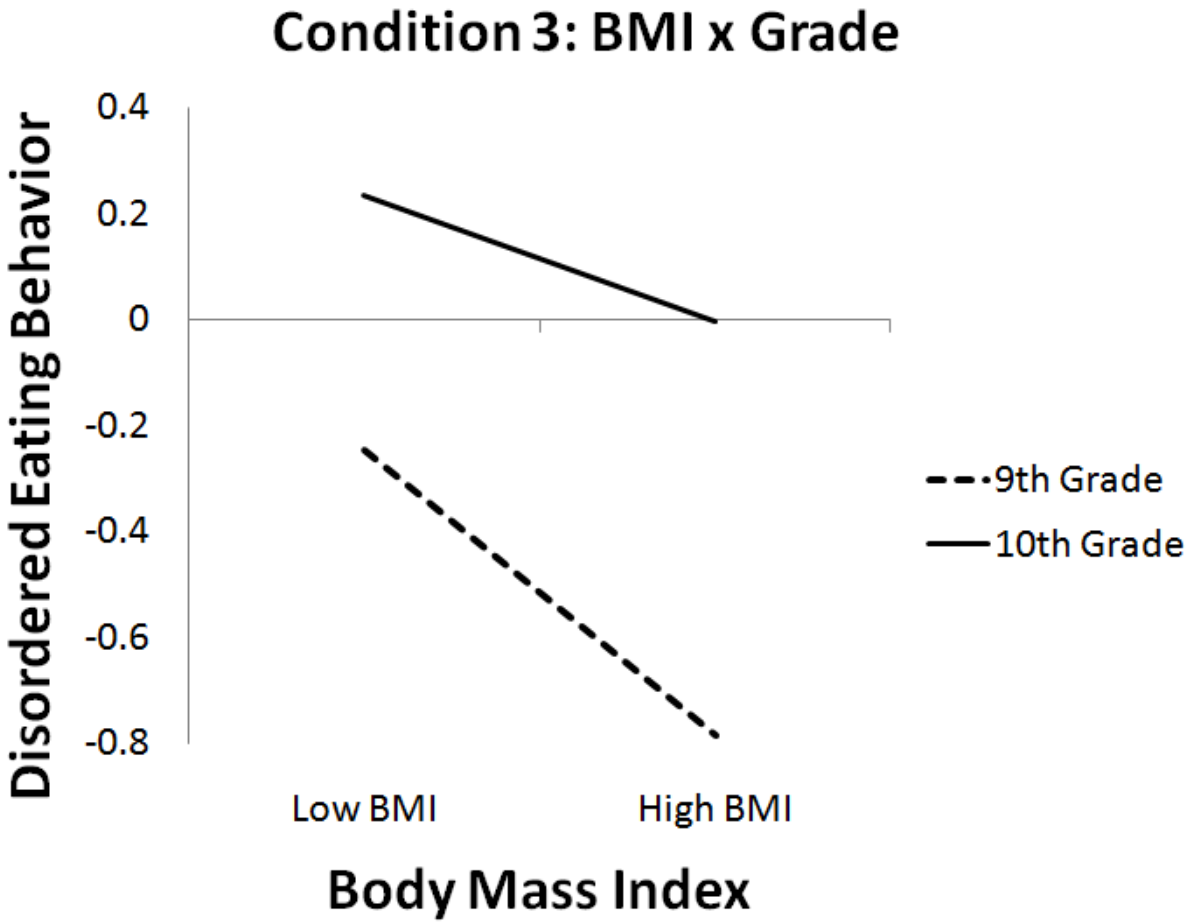

Figure 4. Moderation of the association between body mass index (BMI) and experimental disordered eating scenario responses (DEB) by grade in Condition 3. After controlling for pre-intervention (i.e., Phase I) DEB responses, increases in BMI significantly were associated with less maladaptive Phase II DEB responses among 9th grade participants. For 10th grade participants there was no significant association between BMI and Phase II DEB responses.

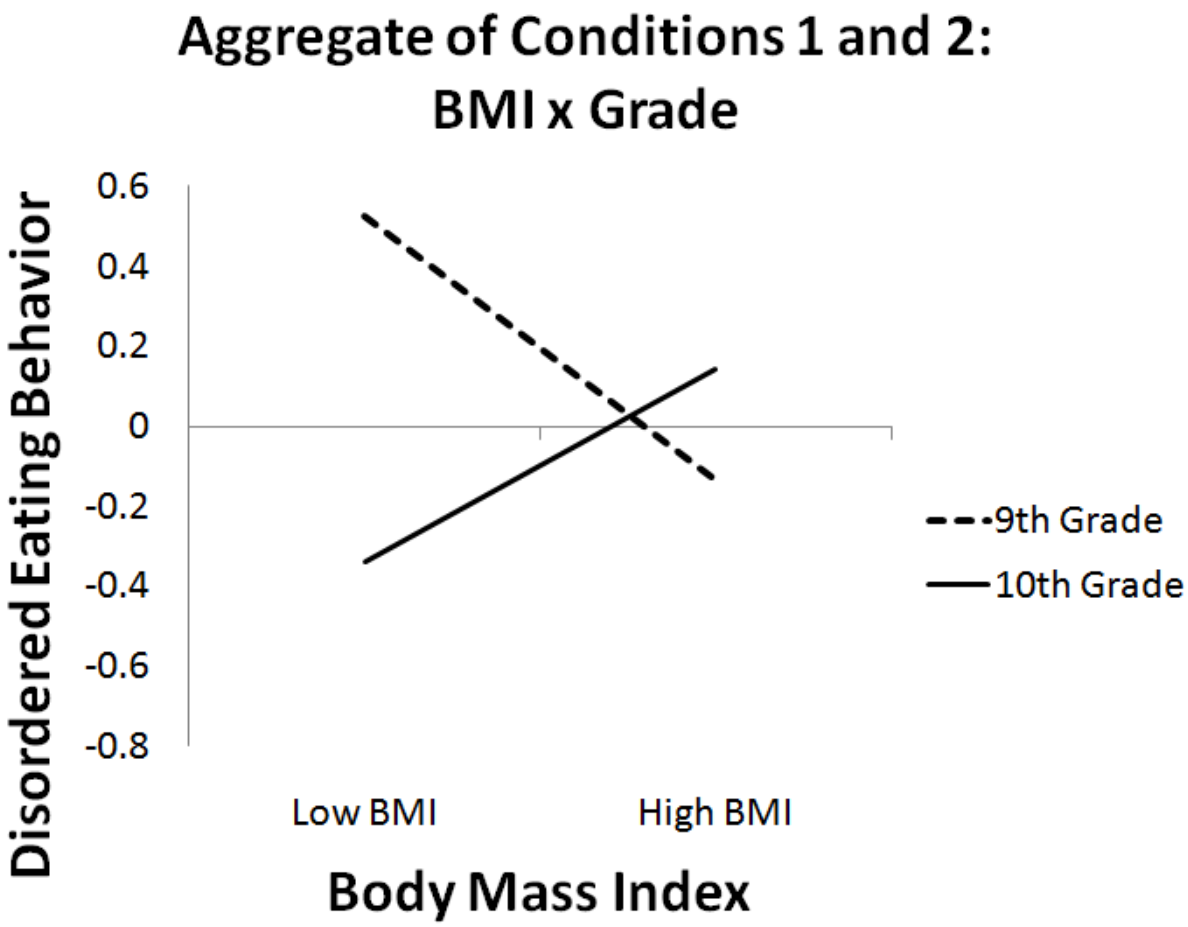

Figure 5. Moderation of the association between body mass index (BMI) and experimental disordered eating scenario responses (DEB) by grade for participants *not* in Condition 3. After controlling for pre-intervention (i.e., Phase I) DEB responses, increases in BMI significantly were associated with less maladaptive Phase II DEB responses among 9th grade participants. For 10th grade participants, increases in BMI significantly were associated with more maladaptive Phase II DEB responses.

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