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Examining How Overweight Adolescents Process Social Information: The Significance of Friendship Quality

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Abstract

The current study examines the social information processing and coping styles (*SIP*) of overweight and average weight adolescents, and whether the associations between friendship quality and *SIP* differ for these two groups ($N = 156$, M age = 12.79). On the basis of height and weight assessments, overweight ($n = 70$) and average weight ($n = 86$) adolescents were identified. Participants reported on positive and conflictual qualities of their friendships, and their attributions, emotional reactions, and coping strategies in response to hypothetical negative peer events. Results revealed that for overweight adolescents, positive friendship quality was negatively associated with emotion-focused coping, and friendship conflict was positively associated with internal blame attributions, but the associations between these variables were not significant for average weight adolescents. Findings suggest that positive friendships may represent protective factors in the lives of overweight adolescents whereas highly conflictual friendships may increase risk.

Keywords

friendships; at-risk populations; social cognition

Theoretical and empirical models of risk and adaptation emphasize individual child characteristics (e.g., aggressive behavioral style), environmental or relational contexts (e.g., peer or familial context), and the interaction between these individual and environmental risk and/or protective factors when predicting adjustment outcomes during childhood and adolescence (Magnusson & Stattin, 2006). In recent years, applications of these models have shown that positive, high-quality friendships can function protectively for children and adolescents considered at risk due to their individual child behavioral characteristics (e.g., shyness; Fordham & Stevenson-Hinde, 1999).

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Being overweight is a well-known individual characteristic that places children and adolescents at risk for an array of developmental difficulties, including social, emotional, and health problems (e.g., Faith, Leone, Ayers, Moonseong, & Pietrobelli, 2002; Puhl & Latner, 2007; Storch et al., 2007). The correlates and consequences of being overweight are receiving increased attention as the incidence of childhood and adolescent obesity grows steadily in the United States, Canada, and Europe (Ogden et al., 2006). Although being overweight clearly represents an individual risk factor for psychosocial and health difficulties, at this time, no investigators have examined whether overweight adolescents are at risk for social-cognitive biases, despite speculation that negative cognitive biases may interfere with health and lifestyle change in overweight youth (e.g., Epstein, 2003; Lake et al., 2004; Soetens & Braet, 2007). It is also not known whether high-quality friendships represent positive forces in the lives of overweight adolescents or whether highly conflictual friendships cause harm. Yet, such information is needed to better understand the ways in which peer relationships impact the adjustment of overweight adolescents, especially since intervention efforts often include peers or close friends. The present study was designed to address these research gaps by examining the social information processing and coping strategies (*SIP*) of overweight adolescents and average weight adolescents, and whether the associations between positive friendship quality and conflict and *SIP* differ for overweight and average weight adolescents.

Social information processing theorists propose that when individuals encounter negative social situations in which the intent of the peer provocateur is ambiguous, they first encode and interpret social cues and information, then decide upon situational goals and evaluate possible responses to the situation, and finally enact a response decision or strategy (Crick & Dodge, 1994). Emotional processes are thought to influence each step of the model (Lemerise & Arsenio, 2000). This framework has been usefully applied in studies of aggressive children to demonstrate that their hostile attributional biases (e.g., expectations that negative events occur because others dislike or intend to harm them) and aggressive response/coping strategies are concurrently and predictively associated with their behavior (e.g., Dodge et al., 2003). Since aggressive children are often rejected by peers, and other children are more likely to choose aggressive coping strategies when peer instigators are aggressive compared to when they are non-aggressive (e.g., Dodge, 1980), it is argued that aggressive children's hostile attributional biases are often warranted given their negative peer environments. In response to such peer hostility, it is not too surprising that aggressive children are more likely than their non-aggressive peers to endorse aggressive coping strategies (e.g., Dodge, Murphy, & Buchsbaum, 1984).

The first goal of the present study was to examine the ways in which overweight adolescents process ambiguous negative social information. Research on social information processing during childhood and adolescence has been dominated by studies of aggressive children (for notable exceptions, see Burgess, Wojslawowicz, Rubin, Rose-Krasnor, & Booth-LaForce, 2006; Quiggle, Garber, Panak, & Dodge, 1992). However, the social environments of overweight adolescents are critical, hostile, and rejecting (e.g., Friedman & Brownell, 1995), and thus it is likely that overweight adolescents think and feel about peer events and their social worlds in negative ways. For instance, overweight children and adolescents encounter considerable societal stigma in their everyday lives (e.g., Braet, Tanghe, Decaluwe, Moens, & Rosseel, 2004; Friedman & Brownell, 1995; Puhl & Latner, 2007). They are also frequently rejected and victimized by their peers (Adams & Bukowski, 2008; Neumark-Sztainer, Croll, et al., 2002; Neumark-Sztainer, Falkner, et al., 2002; Strauss, Smith, Frame, & Forehand, 1985). It is argued that these problems are due in part to the negative attitudes that individuals of all ages (including young children) hold toward obese individuals (e.g., Cramer & Steinwert, 1998; Sigelman, Miller, & Whitworth, 1986), and widely-held beliefs that overweight individuals have more negative personalities and behavioral characteristics than do non-overweight individuals (e.g., Bell & Morgan, 2000). These findings led us to hypothesize that

overweight adolescents may be more likely to report attributions of external or hostile blame than average weight adolescents when presented with hypothetical negative social situations involving peers.

In light of evidence that overweight adults often blame themselves, and specifically their weight, for their social difficulties (Crocker, Cornell, & Major, 1993), we also predicted that overweight adolescents would be more likely to make internal blame attributions than average weight adolescents. We further hypothesized that overweight adolescents would report more internalizing (sadness) and externalizing (anger) emotional reactions in response to negative social scenarios relative to average weight adolescents since higher body mass indices (*BMI*) and negative body weight-perceptions have been associated with both internalizing and externalizing difficulties during late childhood and adolescence (e.g., 7–14 years; Bradley et al., 2008; 11–16 years; ter Bogt et al., 2006). Finally, it was predicted that overweight adolescents would be more likely to endorse the coping strategies of active avoidance (e.g., walking away from the situation) and emotion-focused coping (e.g., feeling upset but doing nothing), which may be reflective of passive avoidance, relative to average weight adolescents. There is some evidence that overweight children and adolescents often choose to avoid physical activities with their peers, such as gym class (Faith et al., 2002) and other types of group exercise (Storch et al., 2007). Positive associations between *BMI* and general avoidant coping tendencies, and also avoidant personality pathology, have been revealed in samples of obese adults (e.g., Petry, Barry, Pietrzak, & Wagner, 2008; Ryden et al., 2001). However, whether these general tendencies exist during early adolescence remains unknown.

Individual differences in social information processing appear to be a function of both individual child characteristics and variability in the affective nature of children's peer relationships (e.g., Peets, Hodges, Kikas, & Salmivalli, 2007). In keeping with peer relations theory and research demonstrating that intimate and supportive friendships positively contribute to psychological well-being (Rubin, Bukowski, & Parker, 2006), recent studies have shown that positive, emotional ties with close friends can positively influence how adolescents think about themselves and how they process social information (e.g., Burgess et al., 2006). For example, Bowker and colleagues (Bowker, Rubin, Rose-Krasnor, & Booth-LaForce, 2007) found that some of aggressive children's negative and hostile social information processing biases were diminished when they had high-quality friendships, and this was even the case when they had similarly-aggressive friends. On the other hand, they also found that aggressive children's tendencies to endorse vengeful coping strategies were greater when they had highly conflicted relationships with aggressive friends. Drawing from Sullivan's (1953) arguments about the importance of children's *chumships* for psychological well-being, the authors hypothesize that positive friendships can diminish hostile and insecure thoughts about others, and promote more positive perceptions of others, but that conflicted friendships may confirm negative expectations, and that this may be especially true for adolescents who are at risk for internalizing and externalizing problems.

Accordingly, the second study goal was to test whether the quality of overweight adolescents' friendships is associated with their *SIP*. Limited research has been focused on the friendships of overweight adolescents, but it is clear that they are as likely as their non-overweight peers to have at least one mutual, high-quality friendship (Carr & Friedman, 2006; Zeller, Reiter-Purtill, & Ramey, 2008), and that they typically form reciprocated friendships with similarly-overweight peers (Crosnoe, Mueller, & Frank, 2008; Halliday & Kwak, 2009; Renna, Grafova, & Thakur, 2008; Trogon, Nonnemaker, & Pais, 2008). No researchers, to our knowledge, have tested whether high-quality friendships may serve as protective factors and whether conflicted friendships may function as risk factors in the lives of overweight adolescents, but the aforementioned findings (Bowker et al., 2007) raise the possibility that the quality of overweight adolescents' friendships may be significantly associated their *SIP*. Yet, it should

be noted that the developmental significance of involvement in positive high-quality friendships is somewhat controversial since a subset of studies have demonstrated that some positive high-quality friendships actually contribute to negative thoughts and feelings about the self and others and emotional adjustment difficulties during adolescence (e.g., Bowker & Rubin, 2009; Rose, 2002). It is also important to note that only a handful of researchers have examined how friendship conflict is related to adolescent adjustment (e.g., Burk & Laursen, 2005). And, there is some recent evidence suggesting that the friendships of overweight youth can lead to increased adjustment difficulties, including increased eating (e.g., Salvy, Howard, Read, & Mele, 2009) and weight gain (Halliday & Kwak, 2009). Thus, in this study, we explored the possibility that positive high-quality and conflicted friendships might be positively or negatively associated with the *SIP* of overweight adolescents.

Summary and Objectives

Guided by the child-by-environment framework for understanding risk and adaptation (Magnusson & Stattin, 2006), our first objective was to investigate the social information processing and coping styles of overweight and average weight adolescents. The second objective was to determine whether the associations between friendship quality (positive quality and conflict) and *SIP* differed for overweight and average weight adolescents. We have chosen to focus on young adolescents because early adolescence is the developmental period during which friendships both become more intimate and influential on adjustment (Rubin et al., 2006). Due to the paucity of research on overweight adolescents' *SIP* and friendships, no specific hypotheses were offered in regard to sex differences. However, varying forms and functions of boys' and girls' friendships have been revealed in the peer relationships literature (Rose & Rudolph, 2006). There also is some evidence suggesting that girls experience being overweight more negatively than do boys (e.g., Needham & Crosnoe, 2005) and that the friendships of overweight girls may contribute more negatively to their adjustment relative to those of overweight boys (Trogdon et al., 2008). Therefore, possible sex differences were examined in each set of analyses. Given strong linkages between race, income, victimization, and being overweight (see Forshee, Anderson, & Storey, 2004; Gable & Lutz, 2000; Janssen, Craig, Boyce, & Pickett, 2004), these variables were controlled in regression analyses.

Method

Participants

Participants were 156 adolescents (77 boys) between 10–15 years of age (M age = 12.79, SD = 1.20) who were part of a larger non-clinical, community sample recruited to participate in laboratory studies on the effects of the social context on food intake and physical activity (e.g., removed for blind review). Eligibility criteria for participation included the absence of: (a) a cold or upper respiratory distress (because participants were asked to perform some physical exercise in the larger study), (b) current psychopathology; and (c) developmental disability. Adolescents were also excluded if they were below the 10th BMI percentile (so that underweight youth were not a part of the studies) or if they were taking medications that could influence taste, appetite or olfactory sensory responsiveness (e.g. methylphenidate). The majority of participants were Caucasian (77%); the remaining participants were African-American (18%), Asian (1.3%), Hispanic (1.3%), or biracial/other (2%). In terms of family income, 35 percent of parents reported a family income of \$9,999 to \$50,000, 55 percent reported an income of \$50,000 to \$109,999, and 10 percent reported their family income to be \$110,000 to over \$200,000. Approximately 70 percent of participants lived with two parents, as reported by their parents.

Procedure

Families were recruited with newspaper ads and from our database of families who have volunteered for previous laboratory studies. Parents were screened by phone for their child's height, weight, a brief medical history, and ethnic background. If youth met the eligibility criteria described above for our laboratory studies, they were scheduled to come to the university laboratory. Upon arrival to the laboratory, all participants heard an assent script and were asked if they were willing to take part in the study. Parents provided written consent. Height and weight measurements were obtained by a trained staff member after the experimental procedures and measures were completed. Then, adolescents and their parents were debriefed and compensated with a gift card for a shopping mall.

Measures

Height, weight, and BMI—Height and weight were measured by a trained research assistant. Adolescents' weight was measured using a digital scale assessed daily for accuracy and height was assessed using a SECA stadiometer. On the basis of the height and weight data, the BMI was calculated according to the following formula: $BMI = kg/m^2$. The BMI-for-age percentile (z-score BMI) was further used to interpret the BMI number because BMI is both age- and sex-specific for children and adolescents. These criteria are different from those used to interpret BMI for adults, which do not take into account age or sex. Age and sex are considered for children and adolescents because the amount of body fat changes with age and the amount of body fat differs between girls and boys (Kuczmarski et al., 2000). Based on these criteria, the study sample comprised 70 (42 boys) overweight or at-risk-of-overweight adolescents ($> 85^{th}$ BMI percentile; boys: $M z_{bmi} = 1.74$, $SD = .51$; girls: $M z_{bmi} = 1.46$, $SD = .90$) and 86 (35 boys) average weight adolescents ($\leq 85^{th}$ BMI percentile and $\geq 10^{th}$ BMI percentile; boys: $M z_{bmi} = .19$, $SD = .89$; girls: $M z_{bmi} = .04$, $SD = .90$), according to current guidelines for weight in children and adolescents set forth by the Centers for Disease Control (Kuczmarski et al., 2000).

Friendship quality (FQS; Bukowski, Hoza, & Boivin, 1994)—The 23-item *Friendship Qualities Scale* was used to assess self-perceptions of friendship quality. Participants were instructed to complete the measure in reference to their relationship with their same-sex "very best friend" and to indicate how true each item was about their friendships on a 5 point scale (with values ranging from 1= Not at all true to 5=Really true). The reliability and validity of the *FQS* has been previously established (Bukowski et al., 1994), and the measure yields five subscales in the areas of companionship (4-items; e.g., "My friend and I spend all our free time together"), conflict (4-items; e.g., "I can get into fights with my friend"), help (5-items; e.g., "If I forgot my lunch or needed a little money, my friend would loan it to me"), security (5-items; e.g., "If I have a problem at school or at home, I can talk to my friend about it"), and closeness (5-items; e.g., "If my friend had to move away, I would miss him/her"). Higher scores on each of the scales indicate higher levels of friendship qualities or higher levels of conflict. In the present study, the companionship, help, security, and closeness subscales were highly correlated ($r = .42-.70$). Therefore, similar to previous studies (see Furman, 1996), mean ratings across these items were calculated, yielding an index of positive friendship quality (overall alpha = .89). The alpha for the conflict factor was also acceptable (.71).

Social information processing and coping (ACQ; Burgess et al., 2006)—The *Attributions and Coping Questionnaire* was used to assess attributions, emotional reactions, and coping strategies in response to hypothetical, negative peer situations. Participants were presented with five hypothetical scenarios involving an unfamiliar peer; each scenario ended with a negative outcome. Participants were asked to imagine being the protagonist of the scenario. Each vignette was followed by questions assessing the child's attributions (e.g., "Why did the kid get milk all over your back?"), emotional reactions (e.g., "How would you feel if

this really happened to you?”) and coping strategies (e.g., “How would you deal with (or handle) this situation if it happened to you?”). For each question, participants were instructed to circle one answer from the situation-specific choices that were provided. To assess attributions, four choices were provided: (1) an item descriptive of a prosocial attribution, wherein a child gives another the benefit of the doubt and assumes positive intent; (2) an item describing an attribution of external blame; (3) an attribution of internal blame; and (4) an item descriptive of a neutral attribution, in which the cause was perceived as accidental or coincidental. To assess emotional reactions, adolescents chose between four possible emotional reactions: okay, sad, angry, or embarrassed. To assess coping styles, adolescents selected a response descriptive of the five following coping strategies: avoidance, adult assistance/intervention, revenge, emotion-focused (feel upset but do not take any action), and appeasement. Participants’ questionnaires were first coded as either 0 (did not select the answer) or 1 (did select the answer) for each possible item response on all five vignettes; thereafter, scores were averaged across the five vignettes. This measure has been used successfully in previous research, with the attributions and coping strategies composite variables distinguishing between aggressive, shy/withdrawn, and non-aggressive/non-withdrawn children (Bowker et al., 2007; Burgess et al., 2006). Of specific interest in the present study were adolescents’ tendencies to make attributions of *external blame* (e.g., “The kid wanted to make fun of me”) and *internal blame* (e.g., “I must have done something to make it happen”), report emotional reactions of *sadness* and/or *anger*, and endorse *avoidant* (e.g., “I’d leave the lunchroom”) and *emotion-focused* coping strategies (e.g., “I would do nothing but I’d be upset”).

Victimization (Kochenderfer & Ladd, 1996)—Participants completed a self-report measure of peer victimization. The measure included 4 items descriptive of physical (“Hit or kick you”), verbal (“Say mean things to you”), indirect (“Say bad things about you to other kids”), and general victimization (“Pick on you”), and 11 filler items (e.g., “Play games with you”). Participants were asked to indicate how often they experienced each type of peer experience on a 3 point scale (with values ranging from 1= Never to 3= A lot). A mean score was calculated, with adequate reliability ($\alpha = .79$). Previous researchers have revealed significant correlations between this self-report measure and peer-reports of victimization (Kochenderfer & Ladd, 1996). In the current study, the mean peer victimization score was 1.42 ($SD = .40$; range = 1.00 to 2.50). Exploratory analyses revealed that overweight adolescents ($M = 1.51$, $SD = .41$) reported significantly more victimization than did average weight adolescents ($M = 1.36$, $SD = .38$), $t(133) = 2.15$, $p < .03$, $d = .37$.

Statistical Analyses

First, to correct for the positive skew, square root transformations were applied to the external blame and internal blame attribution variables, and inverse transformations were applied to the friendship conflict, victimization, emotion-focused coping, avoidant coping, and emotional reactions of sadness variables. Positive friendship quality, which was negatively skewed, was reflected and a log transformation was applied. All of these transformations are common procedures in peer relations research (see Tabachnick & Fidell, 2007). Transformed data were used in all analyses. Second, means, standard deviations, and correlations among study variables were examined in preliminary, descriptive analyses.

Next, twelve hierarchical linear regression analyses were conducted to examine the associations between weight status and *SIP* (external blame attributions, internal blame attributions, emotional reactions of sadness and anger, avoidant and emotion-focused coping), and to assess whether positive friendship quality and conflict (run in separate models) were moderators. In each regression analysis, sex, race, total family income, and victimization, were entered as control variables at Step 1. Adolescents’ weight status (dummy coded as 0 =

overweight and 1 = average weight) and positive friendship quality or conflict from the perspective of the target child were entered at Step 2. At Step 3, the two-way interactions between weight status and positive friendship quality or conflict were entered. Variables were centered prior to the formation of interactions. All interactions were probed according to the procedures outlined by Aiken and West (1991). For ease of communication, only models with at least one significant f change statistic and significant main and/or interaction effects are reported below and presented in tables. However, results from all analyses are available from the first author upon request. It is also important to note that interactions involving sex were examined. No significant two-way or three-way interactions involving the sex variable were revealed, and thus were removed from the final regression models. Additional analyses that included interactions between positive friendship quality, friendship conflict, and weight status did not reveal any significant three-way interactions.

Results

Descriptive Analyses

For descriptive purposes, means and standard deviations and intercorrelations among relevant measures are shown in Table 1. Results indicated modest associations between certain variables, such as attributions of external blame and emotional reactions of anger. Similar associations were revealed when correlational analyses were performed separately by sex, with one exception: the correlation between weight status and external blame was significant for girls, $r(78) = -.26, p < .03$, but not for boys, $r(75) = -.03, ns$.

Regression Models

When internal blame attributions were the dependent variable and conflict was the moderator, the interaction effect for weight status and conflict was significant (Table 2). Follow-up simple slope analyses revealed a significant association between friendship conflict and internal blame attributions for overweight adolescents, $b = .39, p < .02$. The association between conflict and internal blame attributions was not significant for average weight adolescents ($b = -.07, ns$).

When anger was the dependent variable and positive friendship quality was the moderator, the interaction between weight status and positive friendship quality was significant (see Table 3). Follow-up simple slopes analyses revealed a significant association between positive friendship quality and emotional reactions of anger for average weight adolescents, $b = .43, p < .005$, but the association between these variables was not significant for overweight adolescents, $b = -.19, ns$.

Finally, when emotion-focused coping was the dependent variable and positive friendship quality was the moderator, we found a significant interaction effect for weight status and positive friendship quality (see Table 4). Follow-up simple slope analyses revealed a significant negative association between positive friendship quality and emotion-focused coping for overweight adolescents, $b = -.34, p < .04$. The simple slope for average weight adolescents was not significantly different from zero, $b = .001, ns$.

Discussion

To our knowledge, this is the first study to compare the social information processing and coping styles (*SIP*) of overweight and average weight adolescents. Results indicated that overweight and average weight boys and girls think about hypothetical negative social scenarios in similar ways. However, when the associations between positive friendship quality and conflict and the *SIP* variables were examined, we found a different pattern of results for adolescents who were overweight versus those who were average weight, even after controlling

for peer victimization, race, and family income. Taken together, findings from this study highlight the importance of assessing friendship quality in studies of overweight adolescents' psychosocial adjustment, and suggest that depending on the quality, friendships may function as risk or protective factors in the lives of overweight adolescents.

One of the most striking findings from this investigation was that self-reports of positive friendship quality were negatively associated with emotion-focused coping for overweight adolescents, but the association between these two variables was not significant for average weight adolescents. This finding is consistent with the child-x-environment framework (Magnusson & Stattin, 2006). Some recent peer relations research indicates that positive, supportive friendships can be especially helpful for children and adolescents who are at risk for internalizing and externalizing problems due to their difficulties with the larger peer group (Rubin et al., 2006), such as anxious-withdrawn and aggressive youth (e.g., Bowker et al., 2007). Our results extend these findings by suggesting that supportive and caring friendships may also be especially beneficial for overweight adolescents. Indeed, we found evidence that overweight adolescents who have positive friendships may be somewhat protected from developing certain unhealthy coping patterns relative to overweight adolescents with less positive friendships, perhaps because overweight adolescents with supportive and intimate friendships feel less socially isolated and alienated. As a result, they may be better able to cope with their social difficulties in more confident and healthy ways. This interpretation is consistent with previous research in which adolescents with stable, high-quality friendships were found to be less likely to rely on passive coping to deal with daily hassles relative to adolescents with unstable, low-quality friendships (Bowker, Bukowski, Hymel, & Sippola, 2000). Since emotion-focused coping in our study referred to emotional coping without any *action*, this result points to the possibility that clinicians, social workers, and teachers interested in helping overweight adolescents and producing behavioral change may be best to target their interventions toward overweight adolescents who are involved in unsupportive friendships. Some research suggests that overweight adolescents actively avoid physical activity (Strauss et al., 2007) but we failed to find evidence that overweight adolescents are more likely than average weight adolescents to endorse active avoidant coping strategies to deal with hypothetical negative peer events. Thus, results further suggest that interventions efforts may need to focus on *context*-specific coping strategies.

Also supporting the child-x-environmental framework (Magnusson & Stattin, 2006), we found that self-reported friendship conflict was associated with higher levels of internal blame for overweight adolescents. The association between friendship conflict and internal blame was not significant for average weight adolescents. Although some evidence indicates that many obese adults blame themselves, and specifically their weight, for their social difficulties (Crocker et al., 1993), this finding suggests that overweight individuals' tendencies to blame themselves for social problems may be strongly linked to the degree of conflict present in their friendships, at least during early adolescence. Thompson and colleagues (Thompson et al., 2007) found that overweight girls receive more negative feedback from their friends regarding their appearance and are more often teased by their friends than non-overweight girls. And, it has been found that individuals who feel inferior to others are more likely to self-blame than blame others for criticism (Gilbert & Miles, 2000). Thus, it may be that overweight adolescents with highly conflicted friendships are faced with hostility and criticism at both the group and dyadic levels of social complexity, which, in turn, leads to enhanced internal blame tendencies. This may be especially true for highly conflicted friendships comprising two overweight adolescents if having a similarly-overweight friend leads to increased awareness of social stigma.

Although additional research is clearly needed to test these possible interpretations, it is important to note that most researchers have only compared the *SIP* of children and adolescents

who differ on behavioral characteristics, such as aggression or anxious-withdrawal (e.g., Burgess et al., 2006; Peets et al., 2007). Thus, our study extends previous research with its consideration of an important physical child characteristic. Moreover, these findings add complexity and depth to the growing literature demonstrating that feelings of supportiveness and conflict within friendships can be associated with very different developmental outcomes, depending on the individual characteristics of the adolescent in question (e.g., Bowker & Rubin, 2009; Dishion, McCord, & Poulin, 1999; Kupersmidt, Burchinal, & Patterson, 1995). Of note, it is intriguing that we found a positive association between positive friendship quality and angry emotional reactions for average weight adolescents but not overweight adolescents. This finding was not expected but it is possible that in supportive friendship contexts, some average weight adolescents feel more comfortable to experience or express certain negative emotions such as anger, particularly when the feeling is directed toward an unfamiliar peer.

The current study was limited by several factors that suggest future directions for the study of overweight adolescents and their peer relationships. First, to address issues pertaining to causality and the direction of effects (which our design and analyses could not address), it is important for future studies to be longitudinal. Although weight status and friendship quality may lead to social information processing, it is also possible that certain social information processing styles and biases represent risk or protective factors that lead to weight status and friendship (e.g., internal blame biases may cause a child to withdraw from others and avoid physical activity, which in turn, leads to weight difficulties). Bidirectional associations between weight status, friendship and *SIP* are also likely. Second, all study measures (with the exception of BMI) were self-report, raising possible issues pertaining to shared method variance. Parent and teacher-reports and observational measures of victimization and coping strategies could help to eliminate this possible bias, and also provide evidence of whether overweight adolescents' reported coping strategies differ from their actual behaviors. Third, because friends were not involved as participants in these studies, we were not able to identify adolescents whose friendships were mutual or those without mutual friendships, nor do we know the characteristics of the friends (e.g., their weight status, victimization). Yet, given the importance of these factors in studies of friendship and adjustment with samples of overweight and non-overweight youth (e.g., Hodges, Boivin, Vitaro, & Bukowski, 1999; Salvy et al., 2009), future studies should include measures of mutuality, quality, and best friend characteristics to more fully understand the ways in which friendships impact the adjustment of overweight adolescents. For instance, even though recent research indicates that overweight adolescents typically form friendships with their overweight classmates (e.g., Crosnoe et al., 2008), not all adolescents form friendships with similar others (Guroglu, Haselager, Lieshout, & Scholte, 2007), and Salvy et al. (2009) found that overweight adolescents behave differently with overweight and non-overweight friends. Controlling for the characteristics of the friends in future studies will also be necessary so that the association between weight status and social information processing is not overestimated, and to distinguish between selection and socialization processes.

Fourth, our sample was small in size, which may have prevented the detection of group differences in the *SIP* variables, such as external blame and sadness, and some interaction effects between weight status and friendship quality. Although we controlled for sex differences in analyses, we did perform preliminary, exploratory analyses of sex moderation. However, no significant sex interaction effects were revealed. In this case, differences between overweight and average weight boys and girls may have also been obscured by our small sample size. Our sample was also homogeneous in terms of ethnicity, and thus, findings may not generalize to adolescents from more diverse geographic regions. Inclusion and exclusion criteria and other unmeasured participant selection factors also may limit generalizability of results. On a related note, we controlled for peer victimization in our analyses, but it is also certainly possible that significant behavioral (e.g., aggression) and relational (e.g., peer

rejection) differences existed between our weight status groups that might have impacted our findings. Thus, to better understand the significance of friendships in the lives of overweight boys and girls and to examine possible within-group heterogeneity among overweight adolescents and to address these study limitations, future studies should involve larger, community-based samples, and include assessments of *multiple* risk characteristics (such physical, relational, *and* behavioral characteristics) of overweight young adolescents. Finally, the current study only examined adolescent's thoughts, feelings, and coping strategies in situations involving unfamiliar peers. Yet, there is a growing body of literature demonstrating that adolescents' *SIP* differs across relationship-contexts including situations that involve a mutual friend, a disliked peer, or an enemy (e.g., Peets, Hodges, & Salmivalli, 2008). Thus, researchers would do well to expand the types of scenarios that they present to overweight adolescents to determine whether they think similarly or differently across social contexts.

Despite these limitations, the message from this investigation offers preliminary evidence that weight status does not represent a strong independent risk factor for negative social-cognitive biases. Instead, it appears that positive quality friendships may represent protective factors for overweight adolescents, at least when considering passive, emotion-focused ways of coping, whereas highly conflictual friendships appear to represent risk factors for internal blame. Since one of the goals of cognitive-behavioral therapy with overweight adolescents is to change unhealthy and negative thoughts about the self, food, physical activity, and social others (Epstein, 2003; Sotens & Braet, 2007), it is possible that conflictual and low positive quality friendships hurt (by reinforcing or encouraging negative biases and cognitions) rather than help in many therapeutic efforts to produce behavioral and health-related change. Thus, it may be necessary to consider more carefully the role of close friends in interventions in order to improve healthy lifestyles among overweight children and adolescents.

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Table 1

Zero-order Intercorrelations among Key Study Variables.

	A: External Blame	A: Internal Blame	E: Sadness	E: Anger	C: Avoidant	C: Emotional	Positive Quality	Conflict
Weight	-.14	.20*	.03	-.08	-.11	-.09	.14	-.11
Status								
A: External		-.18*	-.07	.54**	.41**	.22*	-.09	.19*
Blame								
A: Internal			.17*	-.21	.00	.13	.08	.06
Blame								
E: Sadness				-.50**	-.09	.04	.14*	.63
E: Anger					.40**	.17*	-.20*	.13
C: Avoidant						.04	-.15	.21*
C: Emotional							.13	.07
Positive								-.16
Quality								
Conflict								
<i>M</i>	.28	.16	.19	.39	.13	.10	3.83	1.99
<i>SD</i>	.29	.16	.18	.26	.17	.15	0.59	0.81
Range	0–1.00	0–.60	0–.60	0–1.00	0–.60	0–.60	1.96– 4.80	1.00– 5.00

Note. Means and standard deviations were calculated using the raw data. Correlations were calculated using transformed variables. Weight status coded as 0 = overweight, 1 = average weight. A = Attributions, E = Emotional reactions, C = Coping strategies. Due to missing data, degrees of freedom for correlations involving friendship quality and conflict = 150. Degrees of freedom for all other correlations = 151.

*
 $p < .05$.

**
 $p < .001$

Table 2

Summary of Hierarchical Regression Analysis for Weight Status and Conflict Predicting Internal Blame Attributions.

Step, Predictors	B	SE B	B	F	R ²	f ²
1. Sex	-0.04	0.05	-0.08	(4, 114) = 0.70, <i>ns</i>	0.02	0.02
Race	0.03	0.03	0.08			
Income	-0.03	0.04	-0.06			
Victimization	0.33	0.37	0.08			
2. Sex	-0.02	0.05	-0.04	(2, 112) = 2.66, <i>ns</i>	0.07	0.05
Race	0.03	0.03	0.10			
Income	-0.01	0.04	-0.02			
Victimization	0.28	0.39	0.07			
Weight Status	0.10	0.05	0.19*			
Conflict	0.39	0.31	0.13			
3. Sex	-0.02	0.05	-0.04	(1, 111) = 5.90, <i>p</i> < .02	0.12	0.06
Race	0.04	0.03	0.11			
Income	0.00	0.04	-0.01			
Victimization	0.29	0.38	0.07			
Weight Status	0.10	0.05	0.20*			
Conflict	1.18	0.44	0.38*			
Weight Status × Conflict	-1.38	0.57	-0.33*			

Note. Weight status coded as 0 = overweight, 1 = average weight.* *p* < .05.

Table 3
Summary of Hierarchical Regression Analysis for Weight Status and Positive Friendship Quality Predicting Anger.

Step, Predictors	B	SE B	β	F	R ²	f ²
1. Sex	0.02	0.05	0.04	(4, 114) = 0.55, <i>ns</i>	0.02	0.02
Race	-0.01	0.03	-0.03			
Income	-0.03	0.04	-0.07			
Victimization	0.40	0.38	0.10			
2. Sex	-0.03	0.06	-0.05	(2, 112) = 1.49, <i>ns</i>	0.04	0.02
Race	-0.02	0.03	-0.05			
Income	-0.03	0.04	-0.07			
Victimization	0.20	0.39	0.05			
Weight Status	-0.01	0.05	-0.02			
Positive Quality	0.43	0.25	0.19			
3. Sex	-0.03	0.06	-0.05	(1, 111) = 9.52, <i>p</i> < .004	0.12	0.09
Race	-0.02	0.03	-0.05			
Income	-0.03	0.04	-0.07			
Victimization	0.21	0.38	0.05			
Weight Status	-0.01	0.05	-0.02			
Positive Quality	-0.34	0.34	-0.15			
Weight Status $\times$ Positive Quality	1.26	0.41	0.44*			

Note. Weight status coded as 0 = overweight, 1 = average weight.

* *p* < .05.

Table 4
Summary of Hierarchical Regression Analysis for Weight Status & Friendship Quality Predicting Emotion-focused Coping.

Step, Predictors	B	SE B	β	F	R ²	f ²
1. Sex	-0.04	0.02	-0.16	(4, 114) = 3.71, $p < .008$	0.12	0.14
Race	0.01	0.01	0.09			
Income	0.02	0.02	0.13			
Victimization	0.51	0.16	0.29*			
2. Sex	-0.02	0.02	-0.11	(2, 112) = 1.30, <i>ns</i>	0.14	0.02
Race	0.02	0.01	0.11			
Income	0.02	0.02	0.12			
Victimization	0.56	0.16	0.32*			
Weight Status	-0.01	0.02	-0.06			
Positive Quality	-0.15	0.10	-0.15			
3. Sex	-0.03	0.02	-0.11	(1, 111) = 5.29, $p < .03$	0.17	0.04
Race	0.02	0.01	0.11			
Income	0.02	0.02	0.13			
Victimization	0.56	0.16	0.32*			
Weight Status	-0.02	0.02	-0.06			
Positive Quality	-0.39	0.15	-0.40*			
Weight Status $\times$ Positive Quality	0.40	0.17	0.32*			

Note. Weight status coded as 0 = overweight, 1 = average weight.

*
 $p < .05$.