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The Moderating Effects of Organized Activities on the Relations between Body Mass and Social Adjustment in Adolescents

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Overweight and obese children and adolescents often experience social adjustment difficulties, including higher rates of peer victimization and loneliness. Our primary goal was to examine the moderating influences of various aspects of organized activity involvement (i.e., intensity, duration, amount of physical activity, perceived importance, liking, and quality of adult- and peer relationships) on body mass index (BMI) and social adjustment relations. Results suggested that activity involvement moderated BMI-adjustment relations in certain instances. Specifically, fewer hours and less physical activity was associated with less loneliness among heavier adolescents. This study affirms the need for further research to address the impact that organized activity participation has on social adjustment among a variety of youth.

Adolescence is marked by a myriad of bio-psychosocial shifts, including rapid physical changes, emotional and cognitive maturation, and enhanced sensitivity to peer relations (Newman & Newman, 2003). In addition, weight gain associated with puberty may impact on physical and social adjustment. Recent investigations have reported that among children aged 6 -19, 31% were classified as overweight, while 16% were already obese (Barlow, 2007; Hedley, Ogden, Johnson, Carroll, Curtin, & Flegal, 2004). Moreover, the pervasiveness of overweight and obese children and adolescents has been growing over recent decades, and this trend is expected to continue (Lobstein & Wang, 2006). In addition to adverse health consequences (e.g., Zimetkin, Zoon, Klein, & Munson, 2004), excess weight may have social implications. Overweight and obese adolescents may become targets for teasing, leading to isolation and loneliness (e.g., Pearce, Boergers, & Prinstein, 2002; Puhl & Brownell, 2001; Strauss & Pollack, 2003; Swami, et al., 2008; Young-Hyman, Schlundt, Herman-Wenderoth, & Bozylinski, 2003). Accordingly, we considered the relations between BMI and two forms of

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social adjustment relevant for adolescents: peer victimization and loneliness.

Peer victimization is characterized by acts intended to physically or socially harm another peer. To illustrate, victimizing behaviors may harm an individual physically (e.g., fighting) or use relationship status to inflict a social harm, such as excluding someone from social activities or spreading rumors (Prinstein, Boergers, & Vernberg, 2001). One study demonstrated that increases in body mass were associated with increases in physical victimization among adolescent males and relational victimization among females (Pearce et al., 2002). Similarly, a study examined body weight and peer relations in a pre-adolescent sample, reporting that those who were heavier experienced more teasing and less social acceptance than normal weight peers. In addition, researchers found that body weight was a significant predictor of social problems and aggressive behaviors for all adolescents (Young-Hyman et al., 2003). Thus, excess body weight may make some individuals an easy target for some types of victimizing behaviors. Intuitively, excess weight may also make some adolescents more prone to loneliness.

Few studies have investigated loneliness among overweight adolescents. However, one study revealed that overweight individuals were more likely to be socially isolated than normal weight peers. Moreover, overweight peers received significantly fewer friendship nominations than their normal weight peers (Strauss & Pollack, 2003). Another relevant study investigated weight bias among children and college freshman by having participants rank body profiles in the order of whom they would most like to associate. Results indicated the overweight profile was rated less favorably than all others, suggesting overweight adolescents may be less desirable companions than normal weight adolescents (Latnar & Stunkard, 2003). Overweight adolescents may find it difficult to form peer networks and adolescents with higher body mass may be more likely to experience loneliness as compared to normal weight peers. Together, loneliness and peer victimization may be important variables related to weight status. Along these lines, one recent study examining both of these variables demonstrated that when individuals were asked to judge silhouettes of varying body types, the overweight profiles were deemed to be characteristic of individuals that were lonelier and more likely to be teased (Swami et al., 2008). In the current study, we expected higher body mass would be associated with higher levels of loneliness and peer victimization. However, we also anticipated that certain aspects of organized activities would buffer the effect of body mass on social adjustment (i.e., peer victimization and loneliness) among adolescents.

The number of adolescents involved in organized extracurricular activities is impressive. The hallmarks of organized activities are structure, adult supervision, and an emphasis upon skill-building (Eccles, 2005). Based upon the National Survey of Families, 57% of youth between the ages of 12-17 participated in athletics, 29% participated in lessons, and 60% participated in clubs or organizations after school or on weekends (Mahoney, Larson, Eccles, & Lord, 2005). Moreover, organized activities include, but are not limited to, civic, academic and athletic programs or groups.

Recent studies have investigated the relations between organized activity participation and adjustment in adolescents. One such study revealed that participation in any activity type (i.e., pro-social, performance, athletics, school, and/or academic) was linked to higher levels of academic achievement, and academic attainment in terms of college attendance. Moreover, participation in pro-social and performing arts activities reduced the likelihood of engagement in risky behaviors such as drinking, skipping school, and drug use (Eccles et al., 1999). Numerous other studies have corroborated the findings that organized activities appear to offer an environment whereby positive adjustment is nurtured (e.g., Bohnert & Garber, 2007; Bohnert, Kane, & Garber, 2007; Eccles & Barber, 1999; Eccles, Barber, Stone, & Hunt, 2003; Fletcher, Nickerson & Wright, 2003; Fredricks & Eccles, 2008; Mahoney, Cairns & Farmer, 2003; McHale, Crouter & Tucker, 2001; Posner & Vandell, 1999; Randall & Bohnert, 2009; Zaff, Moore, Papillo, Williams, 2003). In the current study, we attempted to verify if organized activities may provide a context that serves to protect youth that otherwise may be at-risk for detrimental social outcomes.

A review of the organized activity literature suggested that only a relatively small number of studies examined activities as they relate to social adjustment variables (see Feldman & Matjakso, 2005). One longitudinal investigation revealed that loneliness decreased across time for adolescents, regardless of their degree of activity involvement. Moreover, athletes reported significantly less loneliness than adolescents in non-athletic activities (Barber, Eccles, & Stone, 2001). A similar investigation reported a consistent and positive relation between athletic participation and social adjustment. Most notably, athletic participation appeared to promote social responsibility, reciprocity, and social skills (Rees & Howell, 1990). Similar findings have also been reported in other studies, in which athletics participation was linked with higher levels of perceived popularity (Melnick, Vanfossen, & Sabo, 1988).

Another study investigated the impact that organized activity participation had upon loneliness during the first year of college (Bohnert, Aikins, & Edidin, 2007). Findings revealed that higher

amounts of (i.e., more intense) activity involvement was linked with better friendship quality in young adulthood for students that had experienced loneliness and social dissatisfaction in late adolescence. In addition, lesser amounts of activity involvement predicted loneliness and social dissatisfaction in students who had experienced poor quality friendships when compared to students who had experienced good quality friendships. Thus, participation in organized activities may be linked with gains in social adjustment areas. Although some studies have demonstrated a link between organized activity participation and decreases in loneliness (e.g., Barber et al., 2001; Bohnert et al., 2007), there is a general lack of research that has examined organized activity and peer victimization. Moreover, most studies in this area have examined the main effect of organized activity involvement on different forms of adjustment. Far fewer have examined activities as a protective factor in other causal links (e.g., BMI-social adjustment). Whereas previous studies have demonstrated that activity involvement may be associated with better adjustment, we treated various indices of activity involvement as variables that may moderate BMI-social adjustment relations.

A relevant study reported that participation in organized activities moderates peer acceptance for overweight and non-overweight elementary school-age children. Specifically, overweight children that participated in after-school programs received higher ratings of popularity (from teachers and students), more peer-group nominations, and fewer negative peer nominations when compared to overweight youth that did not participate in after-school programs (Mahoney et al., 2005). This particular study, along with most other similar investigations, have broadly conceptualized organized activity participation, often based on a sum number of activities, the intensity of involvement (i.e., number of hours per week of participation), or the duration (i.e., years or months) of participation in those activities. While these are useful assessments of activity participation, it is still unclear as to what other underlying aspects of organized activities may be protective. Along those lines, Eccles (2005) argued that organized activity research would benefit greatly from measuring multiple aspects of an activity's contexts.

The developmental and health psychology literatures have offered some intriguing possibilities as to what may be the most influential components of organized activities. First, the degree of importance that an adolescent places upon his or her chosen activities may be a protective activity element. To illustrate, adolescents may be involved in just one activity, but place considerable importance on the activity, and maintain participation for years. In contrast, another adolescent may be involved

in multiple activities concurrently, and not assign importance or value to any one of them.

Second, social relationships offered through organized activity involvement may also influence outcomes (e.g., McHale et al., 2003). To date, however, very few studies have examined the influence of peer relationships in the context of organized activities. Eccles and Barber (1999) cited the importance of peers in promoting positive outcomes, reporting that organized activities with a high number of members that were planning on attending college and also doing well in school appeared to be linked with better adjustment. Another study demonstrated that adolescents who had been victimized or been the target of aggressive behaviors from other peers experienced more depressive symptoms and lower self-worth than their non-victimized peers. Most notably, social support from close friends moderated this link (Prinstein et al., 2001). In addition to the social networks that are formed with peers, beneficial relationships may be formed with adults that serve as sponsors, mentors, and coaches for the organized activities. A formal investigation of the protective capacity of the relationship between adults and adolescents within an organized activity has not been undertaken.

Lastly, physical activity may be another potential protective aspect of some activities. There is a good deal of literature that suggests the amount of physical activity inherent in some activities (e.g., athletics) may also influence the BMI-adjustment relations. Extant work has demonstrated that physical activity may offer benefits towards adjustment, particularly self-worth (e.g., Fox, 2000; Maltby & Day, 2001; Planinsec, Fosnarić & Pisot, 2004; Shepard, 1997; Tiggemann & Williamson, 2000). Organized activities vary widely with the physical output they require, but it appears as though more physical activity is linked with better adjustment (e.g., Gruber, 1985; Tiggeman et al., 2001). One recent study investigated the relations between peer victimization, psychosocial adjustment, and physical activity in overweight and at-risk for overweight adolescents (Storch, Milsom, DeBraganza, Lewin, Geffken, & Silverstein, 2007). Findings revealed that increases in physical activity predicted less peer victimization. Thus, it is possible that physical activity provided through organized activity contexts provides opportunities for positive social interactions.

To examine these potential moderating variables more closely, we examined several indices of organized activity participation including: intensity (i.e., hours per week of involvement), duration (i.e., months or years of involvement) of activity participation, and perceived importance. In addition, we also considered the quality of adult- and peer-relationships and amount of physical activity as potential protective factors of organized activity involvement.

The literature has consistently demonstrated that organized activity participation offers a range of psychosocial benefits (e.g., Eccles & Barber, 1999; Eccles et al., 2003; Fletcher et al., 2003; Mahoney et al., 2003; McHale et al., 2001; Posner & Vandell, 1999; Zaff et al., 2003). However, no study has investigated the moderating influences of organized activities on the relation between body mass and peer victimization and loneliness. Further, no studies to date have examined what particular aspects of organized activities are most critical. We attempted to address these concerns in the current study by investigating whether certain aspects of organized activity involvement (i.e., intensity, duration, perceived importance of activity participation, quality of social relationships, physical activity) buffered the BMI-adjustment links.

We anticipated that: a) more involvement in organized activities (i.e., higher intensity, longer duration, more importance) would result in lower levels of loneliness and peer victimization; b) more involvement in activities would exert a moderating influence on all BMI-adjustment relations; c) better quality of adult- and peer- relationships in the context of activities would exert a moderating effect upon the BMI-adjustment links, and; d) higher rates of intense physical activity would exert a moderating effect upon BMI-adjustment relations.

METHOD

Participants

The sample consisted of 86 female and 64 male ($N = 150$) adolescents. The mean ages for females and males were 14.99 and 14.86 years, respectively. Of this sample, 26% were African American ($n = 39$), 12% were Asian American ($n = 18$), 31% were European American ($n = 46$) and 26% were Latino ($n = 39$). The remaining 5% were reported as being from "other" racial groups ($n = 8$). For the sample, 35.6% of participants reported an annual family income of under \$50,000; 27.8% reported incomes of greater than \$50,000, and 33.6 % of the sample reported an income of more than \$90,000 per year.

Procedure

School administrators and health education instructors (i.e., freshman and sophomore level) at an urban high school in the Midwest were approached several weeks prior to commencement of the study. After the administrators agreed to allow the students to be recruited, we arranged a recruitment session. During the session, the study and the requirements were thoroughly explained to all potential participants. Thereafter, parental assent forms were sent home with all interested students. The students were given several days to return the assent forms to their instructors. After having received parental assent, the participants also

signed consent forms, and subsequently completed the study questionnaires aimed at assessing organized activity involvement, loneliness and peer victimization. All measures were group administered during a class period. Furthermore, during this time the participants were individually weighed and measured for height.

Measures

Body Mass Index (BMI). BMI is a ratio of body mass to stature (i.e., weight in kilograms to height in squared meters). Height and weight measurements were taken using a digital scale for weight and an instrument to measure height (i.e., stadiometer). In a small number of cases ($n = 4$), self-reports of height and weight were used to calculate BMI in the absence of measured data. For the most part in subsequent analyses, BMI was treated as a continuous variable. However in some preliminary analyses BMI scores were used to assign adolescents to weight categories (e.g., underweight, normal weight, overweight, obese). In doing so, current age and gender standards for youth between 2-20 years of age were used (Barlow, 2007).

Organized Activities. The *Organized Activity Impact Form (OAIF)* was created for the purposes of this study and assessed activity engagement. The OAIF allowed the respondent to list up to four organized activities that they are involved in. For each of the activities they were involved in, they were prompted to rate them according to each potential moderator variable. For intensity, duration, and amount of intense physical activity variables, a total score was created by summing across all activities. For all other variables (i.e., importance, peer-, adult-relationships) a mean score was obtained by averaging across all activities. These total and average scores were used in all subsequent analyses. More specifically, the respondent was prompted to identify how many hours per week they are involved (intensity), and how long in years or months they have participated (duration). The subjective activity variables (i.e., perceived importance of activity involvement, perceived quality of adult and peer social relationships) were rated on a five point Likert-style format. For instance, participants indicated how important the activity is to them 1 = *not important at all* to 5 = *very important*. The OAIF also permitted the participant to rate on a scale the nature of the relationship with the adult activity leader/supervisor and the other group members (i.e., 1 = *poor relationship/don't get along* to 5 = *good relationship/get along well*). Furthermore, questions aimed at assessing physical activity inherent in the activity permitted the participant to indicate how often they engage in physical activity that causes them to breathe heavily and perspire. Thus, respondents could rate 6 dimensions of up to 4 activities, yielding a maximum of 24 items on the OAIF. For

the current sample, the alphas for each index of the OAIF ranged from .72 to .88.

Peer Victimization (Prinstein et al., 2001). The *Revised Peer Experiences Questionnaire* (RPEQ) is an 18-item survey that assesses victimization and aggression. Nine of the items asked adolescents about overt (i.e., "A kid chased me like he or she was really trying to hurt me") and relational (i.e., "Another kid gossiped about me so that others would not like me") victimization that he or she has experienced personally over the last 9 months. Adolescents rated each of the nine items on a 5 point scale (1 = *never* to 5 = *a few times a week*) indicating how often they experienced the events. Higher scores indicate more victimization. The RPEQ has demonstrated good validity, as the questionnaire has been significantly correlated with peer-reported victimization (Pearce, Boergers, & Prinstein, 2002). Test-retest reliability for the RPEQ has also been shown to be marginal ($r > .48$) (Prinstein et al., 2001). For the present sample, the alpha coefficient was .76.

Loneliness (Asher & Wheeler, 1985). The *Loneliness Scale for Adolescents* (LSA) is a 24-item survey probing adolescents' feeling regarding their state of loneliness. Eight filler items are excluded when calculating the 16-item composite score. Adolescents rated on a 5 point scale (1 = *not true at all* to 5 = *always true*) how much they feel the statements, such as "I don't have anyone to spend time with," are true. Higher scores indicate *less* loneliness. For the study sample, the alpha coefficient was .89.

Plan of Analyses

For the main hypotheses, hierarchical regression analyses were conducted to determine whether the magnitude of the effect of the predictor variable (i.e., BMI) on the outcome variables (i.e., loneliness, peer victimization) depended upon the level of the activity variables (i.e., intensity, duration, physical activity, liking, importance, adult- and peer-relationships). Together, there were six equations tested for each of the two dependent variables, yielding twelve regression equations. In the first step of all regression models, the main effects of BMI and the specific activity index were entered. On the second step of each respective equation, the two-way interactions (i.e., BMI X intensity; BMI X duration; BMI X importance, BMI X physical activity; BMI X social relationships; BMI X liking) were entered. Any significant interactions were examined in more depth by testing the simple main effects of high and low levels of the moderator variables (Holmbeck, 2002).

RESULTS

Preliminary Analyses

Prior to running the regression analyses, initial analyses were run on the main study variables. These initial analyses included descriptive analyses and correlations for all study variables; χ^2 tests of independence for gender, race and weight status; and between-group (by weight status) comparisons of the dependent social adjustment variables. First, initial analyses run for BMI revealed that the mean scores fell within a normal range for females ($M = 22.76$; $SD = 4.11$) and males ($M = 22.27$; $SD = 4.35$). BMI scores were then used to assign adolescents to discrete weight categories (e.g., underweight, normal weight, overweight, obese). The relative frequencies of the weight status categories did not differ significantly according to race, $\chi^2(3, N = 150) = 15.04, p > .05$. An analysis of the weight categories by gender demonstrated that 71% of females and 61% of males were normal weight. Six percent of males were underweight compared to 1% of females. Lastly, 21% of females were overweight and 7% were obese as compared with 17% and 16% of the males, respectively. However, these gender differences were also not significant, $\chi^2(3, N = 150) = 4.51, p > .05$. Overall, three percent of the participants were underweight, 67% of the participants were normal weight, while 19% were overweight, and 11% were obese.

Correlational analyses indicated that BMI was not significantly associated with any of the activity variables except for physical activity. More specifically, a higher BMI was associated with less physical activity, $r = -.18, p < .05$. All of the activity indices were significantly and positively correlated with one another. Notably, associations between perceived liking, perceived importance, adult-, and peer-relationship variables were particularly strong ($r = .82$ or greater).

Lastly, an analysis of variance (ANOVA) was employed, with weight status as the between-subject factor and loneliness and peer victimization as the dependent variables. Non-significant main effects for weight category on loneliness, $F(3, 146) = .66, p > .05$, and peer victimization, $F(3, 146) = 1.86, p > .05$, emerged. These results indicate the four weight groups reported approximately equivalent levels of loneliness and peer victimization.

Although there was a general lack of significant bivariate relations between BMI and the moderator and dependent variables, and nonsignificant differences between weight groups on the main outcome variables, these findings did not indicate the presence or absence of significant interaction effects. The following regression analysis tested for such interactions.

Organized Activities as a Moderator of the BMI–Adjustment Relations

Regarding the first hypothesis pertaining to main effect of activity participation variables and social adjustment, and contrary to expectations, none of the activity indices were associated with peer victimization. However, results revealed that perceived importance, $\beta = .16, p < .05$, adult-relationships, $\beta = .18, p < .05$, and peer-relationships, $\beta = .22, p < .05$, were related to loneliness. Thus, higher ratings of activity importance, and higher quality of adult- and peer-relationships were associated with less loneliness.

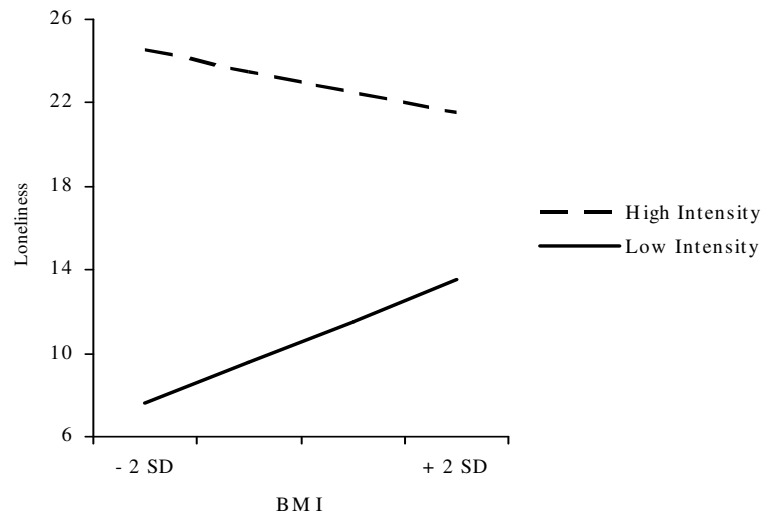


FIGURE 1 The figure displays the simple main effects of BMI on loneliness at low ($p < .05$) and high levels ($p = .20$) of intensity. Higher scores indicate less loneliness.

In relation to the hypotheses regarding moderation, none of the activity indices moderated the relation between BMI and peer victimization. However, two significant interactions emerged for loneliness: BMI X intensity, $\beta = .14, p < .05$, and BMI X physical activity, $\beta = .15, p < .05$. Post-hoc tests examined the simple slopes for the BMI–loneliness regression equations separately at high and low levels of the moderator variables (Holmbeck, 2002). Post-hoc results revealed that at high levels of intensity (i.e., hours per week) higher BMI predicted slightly more (although nonsignificant) loneliness, $\beta = -.10, p > .05$, while at low levels of intensity, higher BMI was associated with less loneliness, $\beta = .19, p < .05$ (see Figure 1). Similarly, at high levels of

physical activity, higher BMIs were associated with more (although nonsignificant) loneliness, $\beta = -.14$, $p > .05$, while at low levels of physical activity, higher BMI was associated with less loneliness, $\beta = .19$, $p < .05$. In sum, there appears to be no relationship between BMI and loneliness for high intensity and physical activity, but a positive relationship between BMI and low intensity and physical activity levels was evident.

DISCUSSION

The main purpose of this study was to examine the impact that participation in organized activities has upon BMI–social adjustment relations. Prior research suggests that adolescents with higher BMI may experience poor social adjustment when compared to adolescents of normal weight (e.g., Zimetkin et al., 2004). Our central focus, however, was the protective influence of various indices of organized activities. Several interesting findings emerged from this study.

Results revealed that higher ratings of activity importance, and higher quality of adult- and peer-relationships were associated with less loneliness. These findings support prior research reporting a link between activity involvement and loneliness (e.g., Barber et al., 2001; Bohnert et al., 2007). These findings suggest that the value of social relationships forged through involvement outcomes may be particularly beneficial in terms of loneliness. Organized activity appears to offer opportunities to interact with others in a positive manner. Moreover, the relationship formed between participants and activity leaders (e.g., mentors, coaches) was also linked with less loneliness. This finding is consistent with resiliency research, which cites the developmental significance of at least one close relationship with an adult (e.g., Flores, Cicchetti & Rogosch, 2005; Masten, 2001). This is one of the first studies to document a relation between perceived importance of an activity and loneliness. Why might perceptions of importance be relevant? Perceived importance may be associated with the desire to master a skill or to be a genuinely committed and involved member of the group, either of which may be qualities that promote positive peer experiences that lessen loneliness.

Second, results suggested that at high levels of intensity (i.e., higher number of hours per week), heavier adolescents reported more loneliness, while at low levels of intensity, heavier adolescents reported less loneliness than adolescents of lower weight. In other words, a high degree of activity involvement was linked with more loneliness for heavier adolescents. These findings may be consistent with social comparison theory (Festinger, 1954). According to this theory, individuals are naturally inclined to evaluate themselves in terms of their opinions and abilities. Moreover, social and physical determinants are

common ways of making such comparisons. The conclusions that individuals draw determine their behavior. It is possible that when heavier adolescents are subject to large amounts of activity involvement, they are more intensely aware of physical differences such as those apparent in body weight. This may result in feelings of isolation and loneliness. An adolescent that is less intensely involved may not become aware of such differences, or are not forced to confront such issues as often. These findings do contrast with results from the only other study that examined the moderating influence of organized activity participation on the BMI-adjustment relation. Mahoney et al. (2005) reported that overweight children, as opposed to adolescents, that had participated in after-school programs received higher ratings of popularity (i.e., from teachers and students), more positive peer-group nominations, and fewer negative peer nominations when compared to overweight youth that did not participate in after-school programs of any kind (Mahoney et al., 2005). The findings from the current study contradict prior work by demonstrating that activity involvement may not necessarily be protective for heavier adolescents.

Some basic differences in the study samples may explain the difference in findings. First, Mahoney et al. (2005) investigated the protective nature of after-school program involvement in 1st and 3rd grade children, while the current study investigated the organized activity involvement relation in 9th and 10th grade adolescents. Second, there were significant differences in the social adjustment outcomes assessed. Mahoney et al. (2005) examined popularity whereas the current study considered peer victimization and loneliness as the primary outcomes. However, significant findings emerged only for loneliness, affirming that loneliness and other peer and social adjustment measure are related, but distinct constructs. Loneliness may be a critical form of adjustment to consider when it comes to overweight adolescents.

It is also possible that more hours per week of involvement indicated a more competitive environment, which may have been problematic for heavier adolescents. Participation in very competitive activities has been shown to increase anxiety (e.g., Smoll & Smith, 1996), and more problem behaviors (e.g., Eccles & Barber, 1999; Mahoney et al., 2004). The current study expands upon these findings by demonstrating that for heavier adolescents, more intense involvement was linked with more loneliness. The 9th and 10th grades offer a range of new activities for adolescents. The competition with peers for spots on teams and clubs, the practice commitments, and the competition schedule present stressful and potentially competitive scenarios for the student. Future research may examine competitiveness as an index of organized activity, and how it influences the BMI-adjustment relations.

In support of this idea, another interesting finding was that at high levels of physical activity, heavier adolescents reported more loneliness, while at low levels of physical activity, heavier adolescents reported less loneliness. This finding does not corroborate many studies that have demonstrated positive effects of physical activity upon other forms of psychological adjustment, such as enhanced self-worth and reduced depressive symptoms (e.g., Barbour & Blumenthal, 2005; Gruber, 1985; Neumarck-Sztainer et al., 2003; O'Brien et al., 1998). However, the current results are consistent with one study that has shown a negative link between physical activity and self-worth in female adolescents (Tiggeman et al., 2000). In terms of social adjustment, another study found that more physical activity was associated with less peer victimization (Storch et al., 2007). The researchers posited that these findings may be due to the notion that heavier adolescents are more likely to avoid situations that involve social interaction and physical activity as these situations may offer opportunities for the overweight individuals to be victimized. Therefore, it is possible that under certain conditions more physical activity may be linked with less desirable social adjustment for heavier adolescents. Together, these findings may mean that effortful physical activity may crystallize the presence of excess weight, leading to more feelings of isolation and loneliness. Heavier adolescents may feel less competent, and feel that others are acutely aware of the differences in weight status. In sum, these findings suggest that more research is warranted that examines the links between physical activity and social adjustment, particularly for heavier adolescents.

Limitations and Future Directions

Some limitations to this study may have affected the findings. For instance, the data analyzed for the current study were of a cross-sectional nature. The cross-sectional design of this and other studies (e.g., Erickson et al., 2000; Pearce et al., 2002; Puhl & Brownell, 2001; Strauss & Pollack, 2003; Strauss et al., 1985; Wallace et al., 1993; Young-Hyman et al., 2003) inhibits causal inferences. Non-experimental, longitudinal designs that control for prior levels of adjustment would add to the present findings. Along these lines, conclusions were drawn from evidence based on correlations between loneliness and adolescents' ratings of various indices of involvements (i.e., activity liking, activity importance, adult relations, and peer relations.) Future work may be aided by comparisons between those who are or are not engaged in organized activities. The data for this study were gathered at one urban high school. A more accurate picture of the direct and moderated links between these study variables may have emerged if a broader sample was selected. Second, more precise assessment methods of some of the study

variables are currently available. Whereas this study used self-report of activity and adjustment variables, teachers, coaches, and parents also offer insightful perspective into an adolescent's daily life. The use of multiple informants makes for more valid and complex research (Holmbeck, Li, Schurman, Friedman, & Coakley, 2002). Student and teacher-reports of social adjustment variables would make meaningful contributions to our understanding of the role of activity involvement in BMI-adjustment relations. Such methods may also contribute to our understanding of the peer networks of overweight adolescents. It is possible that certain activities become more attractive for overweight adolescents. Moreover, more accurate physical activity data collection may include accelerometers, which may more accurately assess physical movement and caloric expenditure. If in fact physical activity is an important variable to consider regarding activity involvement and adjustment, then self-report data of activity may not be adequate.

One of the most compelling reasons for the findings from this study has to do with the characteristics of the sample. It should be noted that the adolescents in the current sample were all from a highly selective, academically-oriented urban high school. High levels of academic performance may also be protective in that it may guard against the negative psychological consequences associated with weight gain. Many students in this particular school may have a primary aim of gaining acceptance into a college or university. To this end, as long as grades are acceptable, the students may be well-adjusted. This may be consistent with the findings from the ANOVA, in that heavier adolescents in this sample did not appear to be more lonely or victimized than their underweight or normal weight peers. The heavier adolescents did not necessarily require additional psychosocial benefits. In other words, heavier adolescents in the current sample may not have needed the "protective" mechanisms that may be inherent in organized activities. Thus, findings that appeared to contradict others (i.e., Mahoney et al., 2005) would not have been surprising. Future research may consider other factors that could lead to positive adjustment among overweight adolescents. Future research may also benefit from analyses of how gender and ethnicity may moderate the BMI-adjustment links. One recent study reported that social adjustment may be moderated by ethnicity (Randall & Bohnert, 2009). Moreover, organized activity involvement may be examined in relation to additional outcome variables such as racial and ethnic identity.

The findings of this study lend some support for the general notion that organized activity participation may be beneficial for loneliness (e.g., Eccles & Barber, 1999; Eccles et al., 2003; Fletcher et al., 2003; Mahoney et al., 2003). The current study demonstrated that loneliness

appears to be an especially salient outcome when considering how youth may benefit from activities, although the degree and magnitude of the benefits associated with organized activities may differ according to the adolescent. Organized activities may not offer the same protective and beneficial characteristics to overweight adolescents as they do normal weight peers. In other words, organized activity may not be a crucial protective factor when considering BMI and adjustment in adolescence.

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