Longitudinal Associations Among Change in Overweight Status, Fear of Negative Evaluation, and Weight-Related Teasing Among Obese Adolescents

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Objective To examine longitudinal bidirectional associations between changes in adolescents’ weight status and psychosocial constructs. Method 118 obese adolescents aged 13–16 years participated in a behavioral weight control intervention. Percent overweight (OW), fear of negative evaluation (FNE), and frequency of weight-related teasing (WRT) were collected at baseline, end of intervention, and 12 and 24 months post-randomization. 3 multivariate latent change score models were estimated to examine longitudinal cross-lagged associations between: (1) OW and FNE; (2) OW and WRT; and (3) FNE and WRT. Results Decreases in OW were prospectively associated with subsequent decreases in both FNE and WRT; however, changes in FNE and WRT were not prospectively associated with subsequent change in OW. Decreases in FNE were prospectively associated with subsequent decreases in WRT. Conclusion Moderate weight loss in the context of a behavioral weight control intervention has positive long-term implications for obese adolescents’ peer relations.

Key words adolescents; fear of negative evaluation; obesity; weight management; weight-related teasing.

Introduction

One third of all adolescents in the United States meet criteria for overweight or obesity (OW/OB; Ogden, Carroll, Kit, & Flegal, 2012). It is well documented that behavioral weight control (BWC) interventions for OW/OB youth result in weight loss, as well as positive changes in psychological functioning such as increased self-esteem (Lowry, Sallinen, & Janicke, 2007) and improved self-concept (Lloyd-Richardson et al., 2012). There also is evidence that BWC interventions positively impact processes associated with overweight status that are more directly tied to social interactions (e.g., decreases in perceived peer rejection and social anxiety; Jelalian, Sato, & Hart, 2011). Changes in these processes and changes in weight likely influence each other over time (Puder & Munsch, 2010); however, no research has considered how social interactions and weight change may impact each other within the context of a BWC intervention.

Developmental theory underscores the significance of peers during adolescence (Hartup, 1996). Peers have an important role in shaping adolescents’ health-related attitudes and behaviors (Brechwald & Prinstein, 2011) and compared with normal-weight peers, OW/OB youth have increased difficulty within the peer context.
(Puhl & Latner, 2007). It is unclear to what extent OW/OB status may precede social difficulties and the degree to which social difficulties may contribute to OW/OB status. Given that OW/OB youth generally experience successful weight loss and psychosocial improvements post-BWC intervention (Jelalian et al., 2011; Lloyd-Richardson et al., 2012), BWC interventions provide a useful paradigm through which the mechanisms of change for both weight and psychosocial functioning can be examined. Observing changes in weight and psychosocial processes may help reveal links between the processes, which can provide preliminary indications about the mechanisms driving the changes. Understanding these mechanisms of change will help elucidate factors that contribute to youths’ weight control.

Data suggest a possible bidirectional association between weight-related victimization and overweight status. First, it is well established that OW/OB adolescents are more likely to experience weight-related victimization than normal-weight youth (Gray, Kahhan, & Janicke, 2009). Second, weight-related victimization is associated with unhealthy weight-related behaviors that may contribute to weight gain (Hayden-Wade et al., 2005; Neumark-Sztainer et al., 2002, 2007), lower levels of physical activity (Jensen & Steele, 2009), and overweight status (Adams & Bukowki, 2008). Although research has focused on this negative cycle of victimization and weight, it is possible that a positive cycle also exists within the context of a BWC intervention. For example, peer support is associated with physical activity levels (Craggs, Corder, van Sluijs, & Griffin, 2011) and healthy food choices (Cutler, Flood, Hannan, & Neumark-Sztainer, 2011). Some research suggests that weight loss may not eliminate victimization among OW/OB youth (Puhl, Peterson, & Luedicke, 2013); however, a decrease in weight via healthy weight control strategies may be associated with sufficient decreases in weight-related victimization to reinforce the healthy weight control behaviors that contribute to weight control. This possible dynamic has yet to be investigated.

OW/OB youth also are more likely to avoid evaluative situations, particularly related to physical activity, than normal-weight adolescents (De Bourdeaudhuij et al., 2005). Fear of negative evaluation (FNE) is defined as worries about others’ evaluations, distress over the negative evaluations by others, and the expectation that others will engage in negative evaluations. Although the association between FNE and weight is understudied, there are some data to suggest that FNE and OW/OB also may dynamically impact each other. First, higher weight status is associated with increased FNE (Phillips et al., 2012; Thompson, Phillips, McCracken, Thomas, & Ward, 2013). Second, higher levels of FNE may be associated with lower levels of physical activity (Hartmann et al., 2010) and disordered eating behaviors, including bulimic behaviors (DeBoer et al., 2013; Gilbert & Meyer, 2005), which are associated with weight gain and OW/OB status (Neumark-Sztainer et al., 2007). For OW/OB adolescents in particular, greater FNE may be associated with increased avoidance of healthy weight-related behaviors, such as physical activity, because of fear of weight-related victimization (De Bourdeaudhuij et al., 2005). Decreasing both weight and FNE among OW/OB youth may be mutually reinforcing changes, particularly in the context of a BWC, yet these associations have not been empirically evaluated.

In addition to understanding how FNE and weight-related victimization may impact OW/OB youths’ weight, it also may be valuable to consider how FNE and victimization are related. Preliminary data suggest a bidirectional relationship between relational victimization and social anxiety (Storch, Brassard, & Masia-Warner, 2003; Storch, Masia-Warner, Crisp, & Klein, 2005). These studies, however, consider social anxiety broadly and do not target OW/OB youth or weight-related victimization, which may attenuate the observed associations. Within a BWC intervention it may be possible to decrease negative bidirectional patterns between FNE and weight-related victimization through adolescents’ participation in group-based physical activity. These activity sessions provide youth the opportunity to have positive experiences with peers and increase their self-efficacy related to physical activity, which may serve to decrease levels of FNE and subsequent victimization. Given the possibility of mutually reinforcing associations between these two constructs and OW/OB teens’ weight, changing the dynamic between FNE and weight-related victimization may be an avenue through which BWC interventions can achieve better outcomes.

A better understanding of the mutually reinforcing associations between weight-related victimization, FNE, and OW/OB adolescents’ weight will clarify how psychosocial experiences interact with OW/OB adolescents’ weight status to sustain or accelerate gains achieved during BWC interventions. This study uses data from a BWC trial with two active interventions to examine bidirectional relationships between change in weight and change in two psychosocial factors: FNE and weight-related teasing (WRT). Additionally, the longitudinal reciprocal association between change in FNE and change in WRT is explored to better understand possible relationships between these psychosocial constructs. Based on integration of the extant empirical and theoretical literature, it is hypothesized that: (1) decreases in weight will be
prospectively associated with subsequent decreases in FNE, and that decreases in FNE will be prospectively associated with subsequent decreases in weight; (2) decreases in weight will be prospectively associated with subsequent decreases in WRT, and that decreases in WRT will be prospectively associated with subsequent decreases in weight; and (3) decreases in FNE will be prospectively associated with subsequent decreases in WRT, and decreases in WRT will be prospectively associated with subsequent decreases in FNE.

Methods
Participants
Participants were 118 overweight adolescents randomized to one of two active, weekly, group-based BWC interventions: (1) cognitive behavioral therapy (CBT) plus supervised aerobic activity, or (2) CBT with peer-enhanced adventure therapy. The sample was primarily female (n = 80; 67.8%) with a mean age of 14.33 years (SD = 1.02). All participants met criteria for overweight or obesity (body mass index [BMI] M = 31.41, SD = 3.33; BMI percentile M = 97.46, SD = 1.84; zBMI M = 1.62, SD = .38; percent overweight: M = 161.43; SD = 16.70). The racial/ethnic composition of the participants was White (n = 92; 78%), African American (n = 16; 13.6%), and other ethnic background (n = 10; 8.5%); 9.3% reported Hispanic heritage (n = 11). Two participants did not provide racial/ethnic information.

Adolescent eligibility criteria at study entry included the following: 30–90% above the median age- and gender-specific BMIs (based on inclusion criteria from previous weight control trials; Goldschmidt et al., 2011), 13–16 years old, English-speaking, and at least one parent or caregiver available to participate in the intervention. Adolescents were excluded if they already were enrolled in a weight control program, met criteria for a major psychiatric disorder, had a medical condition that interfered with the prescribed dietary or exercise plan, or were developmentally delayed such that intervention materials would not have been appropriate.

Data were collected as part of a randomized control trial described elsewhere (Jelalian et al., 2010). Of the 118 adolescents who were randomized to an intervention and completed the baseline assessment, 110 (85%) completed the 16-week BWC intervention, with 93 (79%) completing the 12-month post-randomization follow-up assessment and 89 (75%) completing the 24-month post-randomization follow-up assessment (Lloyd-Richardson et al., 2012).

Procedure
Written informed consent was obtained from parents and adolescents provided assent for intervention study participation. The hospital institutional review board approved this study. The results presented are a secondary data analysis of data from this BWC intervention.

Both treatment conditions included 16 consecutive weeks of active treatment during which adolescents and their parent/caregiver attended separate concurrent 1-hr meetings (Sessions 1–16), and then four bi-weekly maintenance sessions (Sessions 17–20). One treatment condition included group-based CBT with aerobic exercise and involved weekly CBT plus a supervised aerobic activity. The other treatment condition included group-based CBT with peer-enhanced adventure therapy. The peer-based activity sessions were similar to the Outward Bound adventure therapy model (e.g., group activities aimed at developing self-confidence). Adolescents in both conditions were prescribed a balanced deficit diet and gradual increases in physical activity. Data were collected from participants at four time points: baseline (i.e., at randomization), at the end of the intervention (i.e., 4 months post-randomization), at 12 months post-randomization, and at 24 months post-randomization.

Data from all 118 participants at four time points were used in the current study. Previous manuscripts analyzing these data demonstrated that both groups showed improvements in primary outcomes, but group differences did not emerge between treatment groups across the four time points on weight loss (Jelalian et al., 2010; Lloyd-Richardson et al., 2012) or psychosocial constructs similar to those included in this study (Jelalian et al., 2011).

Assessment and Measures
Basic demographic variables were collected from adolescents at baseline assessment, including age, gender, and race/ethnicity. Anthropometric variables and psychosocial measures were collected at the four previously described time points.

Anthropometric Variables
Trained research assistants obtained measures of adolescents’ weight and height. Participants were shoeless and dressed in hospital gowns for these measurements. Height was measured using a wall-mounted stadiometer (Perspective Enterprises, Mortage, MI) and weight was measured on a balance beam scale. Weight and height were used to calculate BMI (kg/m²), zBMI, and percent overweight. ZBMI and percent overweight are standardized for age and gender. Percent overweight provides a value relative to the 50th percentile BMI for the appropriate
age and gender, where positive values indicate being over the 50th percentile and negative values indicate being under the 50th percentile ([(adolescent BMI – BMI at 50th percentile for age and gender)/BMI at 50th percentile] × 100). Percent overweight has demonstrated some advantage with regard to sensitivity to changes in weight as compared with zBMI in OW/OB youth (Cole, Faith, Pietrobelli, & Heo, 2005; Paluch, Epstein, & Roemmich, 2007). To maximize the possibility of identifying reciprocal associations between weight change and change in psychosocial factors, percent overweight was selected over zBMI for use in this study owing to its increased sensitivity to weight change.

Fear of Negative Evaluation
FNE was self-reported using the Fear of Negative Evaluation subscale of the Social Anxiety Scale for Adolescents (La Greca & Lopez, 1998). The FNE subscale contains eight items that measure the degree to which adolescents are concerned with how others evaluate them (e.g., “I feel that peers talk about me behind my back.” or “I feel that others are making fun of me.”). Each item is rated on a 5-point scale from 1 = not at all to 5 = all the time. Responses to the items were summed to create a total score. Higher scores reflect greater social anxiety associated with perceived negative evaluations by others. This scale demonstrated good reliability at baseline (α = .88), 4 months (α = .89), and 12 months (α = .91), with moderate reliability at 24 months (α = .70).

Weight-Related Teasing
Frequency of WRT was assessed using a survey item that has been used extensively in epidemiological studies targeting adolescents’ weight-related attitudes, behaviors, and experiences (Eisenberg, Neumark-Sztainer, Haines, & Wall, 2006; Haines, Neumark-Sztainer, Eisenberg, & Hannan, 2006; Neumark-Sztainer et al., 2002). This survey item was adapted from the validated Perception of Teasing Scale (POTS; Thompson, Cattarin, Fowler, & Fisher, 1993) for epidemiological research (see Neumark-Sztainer et al., 2002 for a description of the item selection process). Participants reported their perception of how frequently they experience WRT (“How often are you teased about your weight?”) using a 5-point scale: 1 = never, 2 = less than once a year, 3 = a few times a year, 4 = a few times a month, and 5 = at least once a week. Higher scores indicate greater frequency of WRT experiences.

Data Analysis
Three multivariate latent change score (LCS) models were estimated using structural equation modeling in MPlus 6.0 (Muthén & Muthén, 1998–2010) to test study hypotheses. LCS models allowed us to evaluate bidirectional influences by estimating the cross-lagged associations (i.e., Y2 on X1; e.g., FNE Time 2 on Weight Time 1, see β paths in Figure 1), while accounting for additional change processes, including change associated with previous levels of a variable (i.e., proportional change) and growth trajectories across all time points (McArdle, 2009). In other words, these analyses decompose participants’ data into three distinct processes: proportional change (e.g., change from X1 to X2; α paths in Figure 1), growth trajectory (e.g., SlpX in Figure 1), and cross-lagged associations (e.g., Y2 on X1; β paths in Figure 1). Non-informative latent variables were included in the model to account for the varying time durations between data points (see Barker, Rancourt, & Jelalian, 2013 for specifics about model construction). Using data from baseline, 4-, 12-, and 24-month assessments, models were estimated to examine longitudinal cross-lagged associations between change in weight and change in FNE, change in weight and change in WRT, and change in FNE and change in WRT. Models were estimated using maximum likelihood estimation with robust standard errors, which provides parameters, standard errors, and a chi-squared statistic that are robust to non-normality and non-independence of observations. Model fit was assessed using the chi-square test of fit (cutoff > .05), the comparative fit index (CFI; cutoff > .95), and the root mean square error of approximation (RMSEA; cutoff < .05; Bollen, 1989). Proportional change and cross-lagged estimates were held constant across all time points.

Univariate LCS models initially were fit to each outcome to evaluate how well inclusion of proportional change and growth trajectory represented the observed data. Because data were collected before and after active BWC interventions, the model included an estimation of change due to treatment (i.e., estimated the intercept and error variance of the first LCS; Txn and σ²tx-n in Figure 1). After the univariate LCS models were fit, multivariate LCS models were estimated as described earlier. Within the multivariate framework, the paths of interest that test study hypotheses were the longitudinal cross-lagged paths (β paths in Figure 1).

Hypotheses were based on the assumption that there would be no differences across treatment groups per previously reported findings from these data (Jelalian et al., 2010, 2011; Lloyd-Richardson et al., 2012). To verify these patterns of results, multiple group models were estimated for each of the three univariate and subsequent multivariate models. As expected, there were no group differences identified for any of the univariate or
multivariate models (data available from the authors on request), thus all results presented in the following text describe estimates from models considering the sample as a whole.

Results

Preliminary Analyses

Correlations, means, and standard deviations of percent overweight, FNE, and WRT frequency are presented in Table I. Initial descriptive statistics suggested that WRT was not normally distributed across all time points; therefore, all WRT data were square-root-transformed. Percent overweight and FNE were approximately normally distributed at all time points.

Univariate Models

Percent Overweight

The initial model was a poor fit to the data, $\chi^2(5) = 20.47$, $p = .001$, CFI = .94, and RMSEA = .16. Model modification indices suggested that model fit would be improved by estimating the error terms of the LCSs between the 12- and 24-month assessments. Estimating these error terms improved the model fit, suggesting that there may be an additional unspecified process contributing to change in percent overweight. With this modification, the model fit the data, $\chi^2(4) = 5.72$, $p = .22$, CFI = .99, and RMSEA = .06. The final model suggested significant proportional change such that participants with higher percent overweight at a given time point showed less change in percent overweight at the subsequent time point.
Participants’ growth trajectory of percent overweight increased across all time points ($b = 66.36$, $SE = 14.35$, and $p < .001$), which is consistent with previous literature demonstrating that obese teens typically continue to gain weight as they age (The, Suchindran, North, Popkin, & Gordon-Larson, 2010).

There was significant variability in these growth trajectories across time ($b = 72.17$, $SE = 29.54$, and $p = .015$).

Treatment-related change was observed such that participants’ percent overweight decreased on average by 5.27 percentage points from the first to the second assessment ($b = -5.27$, $SE = 1.03$, and $p < .001$). The intervention did not change participants’ weight growth trajectory, but instead impacted their proportional weight change.

Fear of Negative Evaluation

The initial model had numeric difficulties, which is not uncommon for complex change models in small to medium sample sizes (Barker et al., 2013). Eliminating individual variability in response to the intervention related to FNE scores (i.e., constraining the error variance of the first LCS to zero) addressed the difficulty and produced a model that fit the data, $\chi^2(6) = 6.89$, $p = .33$, CFI = .98, and RMSEA = .04. No significant effects of proportional change were observed ($b = .22$, $SE = .38$, and $p = .559$) or growth trajectories ($b = 3.48$, $SE = 6.09$, and $p = .567$) were observed for participants’ FNE (Table II). Additionally, no treatment effects were observed ($b = 1.58$, $SE = 1.72$, and $p = .357$).

Weight-Related Teasing

Similar to FNE, the initial model of participants’ perceived frequency of WRT had numeric difficulties. The model was simplified by eliminating the growth trajectory parameter of WRT, which produced a model that fit the data, $\chi^2(8) = 8.56$, $p = .38$, CFI = .99, and RMSEA = .02. No significant effects of proportional change were observed

Note. OW = percent overweight; FNE = fear of negative evaluation; WRT = weight-related teasing; WRT values are square-root-transformed; $X_{BL}$ = baseline assessment; $X_{4}$ = end of treatment assessment/4 months post-randomization; $X_{12}$ = 12-month post-randomization assessment; $X_{24}$ = 24-month post-randomization assessment.

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

### Table I. Means, SD, and Correlations Among Percent Overweight, FNE, and WRT at Baseline, 4-, 12-, and 24-Month Post-Randomization Assessments

<table>
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<th>OW_{12}</th>
<th>OW_{24}</th>
<th>FNE_{BL}</th>
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<th>FNE_{12}</th>
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Mean 161.43 151.58 150.96 151.78 19.34 17.17 15.81 16.44 1.05 .86 .75 .75

SD 16.63 17.50 19.03 20.48 6.71 5.84 5.84 7.42 .66 .58 .72 .72

Note. OW = percent overweight; FNE = fear of negative evaluation; WRT = weight-related teasing; WRT values are square-root-transformed; $X_{BL}$ = baseline assessment; $X_{4}$ = end of treatment assessment/4 months post-randomization; $X_{12}$ = 12-month post-randomization assessment; $X_{24}$ = 24-month post-randomization assessment.

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

### Table II. Unstandardized Parameter Estimates (and Standard Errors) for Univariate LCS Models (With References to Figure 1)

<table>
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<th>Parameter</th>
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Note. Although Figure 1 represents a multivariate model, paths reference the top portion of the figure to provide a visual of the univariate structural equation model tested. Significant parameter estimates are in boldface.
for participants’ WRT ($b = -0.2$, $SE = 0.02$, and $p = .277$; Table II). Significant treatment effects were observed such that participants reported decreases in WRT from the first to the second assessment ($b = -0.21$, $SE = 0.07$, and $p = .001$).

**Multivariate Models**

Percent Overweight and FNE
A multivariate LCS model was estimated with cross-lagged associations between weight and FNE LCSs (Table III). The overall model demonstrated acceptable fit, $\chi^2(20) = 28.16$, $p = .11$, CFI = .98, and RMSEA = .06. Hypotheses were partially supported. Decreases in percent overweight at each time point were associated with decreases in participants’ self-reported FNE at the following time point ($b = 0.16$, $SE = 0.06$, and $p < .01$) over the 24-month study period; however, decreases in FNE were not prospectively associated with subsequent decreases in overweight status ($b = 0.51$, $SE = 0.37$, and $p = 0.17$).

Percent Overweight and Weight-Related Teasing
A multivariate LCS model was estimated with cross-lagged associations between overweight status and WRT LCSs (Table III). The overall model demonstrated good fit, $\chi^2(24) = 25.28$, $p = .39$, CFI = .99, and RMSEA = .02. Hypotheses were partially supported. Decreases in percent overweight at each time point were associated with decreases in perceived frequency of WRT at the following time point ($b = 0.01$, $SE = 0.004$, and $p < .01$) over the 24-month study period; however, decreases in WRT were not prospectively associated with subsequent decreases in percent overweight ($b = 0.58$, $SE = 0.31$, and $p = .36$).

FNE and Weight-Related Teasing
The multivariate LCS model for FNE and WRT (Table III) demonstrated good fit, $\chi^2(26) = 27.26$, $p = .40$, CFI = .99, and RMSEA = .02. Hypotheses were partially supported. Decreases in self-reported FNE at each time point were associated with decreases in perceived frequency of WRT at the following time point ($b = 0.05$, $SE = 0.02$, and $p < .01$) over the 24-month study period; however, decreases in WRT were not prospectively associated with subsequent decreases in FNE ($b = 0.87$, $SE = 0.92$, and $p = .25$).

**Discussion**

The present study demonstrated that weight loss in the context of a BWC intervention is prospectively associated with improvements in psychosocial outcomes (i.e., self-reported FNE, perceived frequency of WRT). Improvements in these psychosocial constructs, however, were not prospectively associated with continued weight loss. This study provides further evidence that within the context of a group BWC intervention, OW/OB adolescents’ weight loss can positively impact important psychosocial constructs. Although data from this BWC intervention suggest that targeting FNE and WRT may not reinforce adolescents’ weight loss, it may be that peer interactions that reinforce weight loss were not adequately captured by examining decreases in constructs such as FNE and WRT. For example, increases in positive body comments from others, as opposed to decreases in WRT, may be associated with continued weight loss or weight maintenance in OW/OB adolescents.

Significant treatment effects were observed for perception of WRT, providing some additional support for existing research demonstrating that BWC interventions are important not only to youths’ weight loss, but also to improvement across social domains. Although no statistically significantly proportional change, growth trajectory, or treatment effects were observed for FNE, it is notable that change in FNE over the course of the study emerged
contingent on change in percent overweight. These data suggest that BWC interventions may positively impact OW/OB adolescents’ perceptions of some social experiences directly (e.g., WRT), and others indirectly (e.g., FNE and WRT via weight loss). This is especially important given that OW/OB youth are at increased risk of struggling with peer relationships and making healthy behavior choices (Farhat, Iannotti, & Simons-Morton, 2010).

There also was evidence suggesting that WRT changed as a function of decreases in FNE over the course of the study, but not vice versa. It may be that the association between WRT and FNE is dependent on weight loss. As OW/OB youth lose weight and experience less FNE, they may also experience less WRT. A second possibility is that participants’ perception of WRT may change as a function of change in other psychosocial constructs (e.g., self-esteem, self-concept). For example, as youth feel more self-confident, they may interpret their peer interactions differently. It may be useful to explicitly target both weight loss and FNE when working with OW/OB youth. Although decreased FNE may not directly impact weight loss, targeting FNE may have broader positive implications, which may be associated with weight loss. Improvements in psychosocial constructs may occur as a function of weight loss or may emerge due to complex multidirectional associations among constructs that are impacted by group BWC treatment (e.g., cognitive, physical, and social interventions).

These findings highlight the clinical importance of evaluating psychosocial functioning and peer experiences when working with OW/OB adolescents both in medical and mental health settings. Although there are no clear thresholds for the amount of weight loss that will lead to consistent and meaningful improvements in psychosocial factors, the findings from this study suggest that even moderate weight loss can positively impact OW/OB youth. In fact, participants remained significantly overweight at the end of treatment, yet, on average, still reported significant improvements in FNE and WRT. It is unrealistic to think that a BWC intervention could lead to complete elimination of problematic FNE and WRT, however, affecting even small improvements in these domains may improve OW/OB youths’ quality of life. Assessing the psychosocial functioning of OW/OB adolescents can provide information that directly impacts both medical and psychological treatment recommendations. For example, if an OW/OB adolescent has high FNE, providing a recommendation that he join a recreational sports league to increase his physical activity likely will not lead to the desired behavioral or weight outcomes, even if the adolescent reported enjoying sports. In terms of mental health treatment, assessing how social concerns may be impacting weight can be helpful to expose previously undisclosed problematic coping skills. Considering how psychosocial factors may be impacting OW/OB youth is an important aspect of providing comprehensive and individualized treatment.

This study contributes to the current literature by examining dynamic associations between adolescents’ weight loss and peer-focused psychosocial constructs (i.e., FNE and WRT). Adolescent BWC intervention research has not examined the possible bidirectional influence between weight loss and change in psychosocial constructs. This is notable given that peer-focused interactions, weight, and appearance all are increasingly salient during the adolescent transition (Jones & Crawford, 2006). Additionally, these associations were modeled using an advanced statistical approach that allowed for the examination of cross-lagged effects, above and beyond change associated with the proportional change and growth trajectories of the constructs of interest over the 2-year study period.

This research could be extended in a number of ways. First, WRT was measured using a single survey item that measures WRT in general. Given the importance of peers during adolescence (Hartup, 1996), future research should examine whether weight loss differentially impacts WRT by peers versus other individuals (e.g., family members) using a more comprehensive and validated measure (e.g., POTS; Thompson et al., 1995). Second, FNE and WRT scores were based on youth self-report. It would be helpful to have multi-method (e.g., observation and coding of peer/social interactions) and/or multi-informant measurement strategies (e.g., peers, parents) to compare whether teens’ report of changes in FNE and WRT is consistent with other people’s observations. Third, these data were gathered in the context of BWC intervention that was designed to impact peer interactions through group physical activity. It may be that these findings would not emerge from a BWC intervention that is focused on other aspects of behavior (e.g., family-based weight control treatment). For example, although there was no impact of treatment on levels of FNE, FNE did decrease over time in the context of weight loss. The observed decrease in FNE may be due to other processes associated with group-based treatment (e.g., normalization of OW/OB teens’ weight-related struggles), rather than weight loss per se. These findings should be replicated using data from other BWC intervention trials that emphasize different weight control behaviors. Fourth, although the sample size was adequate for estimating the models reported, replicating and extending the current findings is important. Specifically, a larger sample would provide sufficient power to allow paths to vary within the models (e.g., allowing all cross-lagged paths to vary). For
example, the impact of weight loss on FNE may not be the same from baseline and post-treatment as from 12- to 24-month follow-up. Further, a larger sample would allow testing of group differences. The reported results may vary across gender or among ethnic/racial groups. Given data suggesting that adolescent girls and boys may respond differently to weight control messages (Gortmaker et al., 1999) and that accurate estimation of weight status may vary across ethnic/racial groups (Martin, Frisco, & May, 2009), gender and race/ethnicity should be explored as moderators of the association between weight change, FNE, and WRT.

Overall, this is one of the first studies to examine dynamic associations between changes in weight status and relevant psychosocial variables among adolescents who have completed a BWC intervention. These data suggest that moderate weight loss achieved by adolescents who have completed a BWC intervention is associated with positive longitudinal improvements in adolescents’ peer relations, but that improvement in psychosocial constructs may not be associated with continued weight loss over time.

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**References**


