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Eating behaviors, victimization, and desire for supportive intervention among adolescents in weight-loss camps

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ABSTRACT

This study examined links between eating behaviors, weight-based victimization (WBV) and preferences for bullying intervention among adolescents. Adolescents enrolled in weight loss camps participated in an online survey ($N = 361$). Regression models examined relationships between key variables. Almost half of adolescents who experienced WBV engaged in unhealthy eating behaviors, which corresponded to less desire for supportive intervention. Unhealthy eating behaviors may offset adaptive coping strategies to deal with WBV, such as support from peers and family.

1. Introduction

1.1. Weight-based victimization: prevalence & consequences

Weight-based teasing and bullying (i.e., weight-based victimization, or WBV) is a prevalent problem for youth (Bradshaw, Waasdorp, O'Brennan, & Gulemetova, 2011; Haines, Neumark-Sztainer, & Thiel, 2007; Puhl & Luedicke, 2012). As many as 30% of girls, and 24.7% of boys, may experience weight-related teasing from peers (Neumark-Sztainer et al., 2002). As body weight increases, so does the risk of weight-based teasing and bullying (Neumark-Sztainer et al., 2002; Puhl, Peterson, & Luedicke, 2013). Recent evidence suggests that weight-based teasing is the most common form of teasing reported by adolescents in the school setting (Peterson, Puhl, & Luedicke, 2012).

Weight-based victimization is associated with numerous risk factors for youth who are targeted (Puhl & Latner, 2007). These risk factors include unhealthy eating behaviors, such as dieting, laxative use, bulimic patterns, and unhealthy weight control practices (Haines, Neumark-Sztainer, Eisenberg, & Hannan, 2006; Haines, Neumark-Sztainer, Wall, & Story, 2007; Lieberman, Gauvin, Bukowski, & White, 2001; Menzel et al., 2010; Neumark-Sztainer et al., 2002). In addition, WBV can lead to behaviors that may exacerbate obesity, such as binge-eating and avoidance of exercise (Faith, Leone, Ayers, Moonseong, & Pietrobelli, 2002; Jensen & Steele, 2009; Neumark-Sztainer et al., 2002).

Given that WBV is associated with an increased likelihood of unhealthy eating and weight control behaviors, it is important to examine whether these eating behaviors are, in turn, associated with youth preferences for intervention from others (e.g., friends or parents) to help them cope with experiences of WBV. Although our recent research has examined how WBV affected youth preferences for intervention to help them cope with bullying experiences (Puhl, Peterson, & Luedicke, 2012), it is not known whether or how eating behaviors might influence the types of coping strategies used by youth. Identifying these links is an important step in efforts to develop interventions that can assist youth to adaptively cope with WBV in ways that do not lead to or reinforce maladaptive eating patterns. The current study examined the relationship between eating behaviors, WBV and preferences for intervention from others (e.g., peers, friends, teachers, parents) among a weight loss treatment- seeking sample of adolescents.

2. Material and methods

2.1. Participants

Adolescents (14–18 years old) enrolled in Wellspring Camps & Academies (http://www.wellspringacademies.com/) and Camp Shane (http://www.campshane.com/) were recruited for the study by program directors via email during spring of 2011. These youth weight-loss programs were selected for their large enrollment, numerous facilities, and participation across the United States. Participants provided written consent and passive parental consent if under 18 years of age.

Data was collected on-line via self-report surveys (see Puhl et al., 2013 for detailed recruitment information). For Camp Shane, 1025

Abbreviations: BMI, Body mass index; U.S, United States; WBV, Weight-based victimization.

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emails with the survey link were received by potential participants, and 400 campers from Wellspring received emails about the survey. Although 550 participants (38.6%) began the survey, a portion of participants did not provide consent ($n = 38$) or did not finish ($n = 123$), which yielded a completion rate of 70.7%. Exclusions were made for participants who were younger than 14 years old ($n = 2$) or older than 18 years old ($n = 5$), underweight ($n = 15$), or non-native English speakers ($n = 6$). Participants from Camp Shane (77%) and Wellspring (23%) were represented in the final sample ($N = 361$).

2.2. Measures

2.2.1. Demographic information

Adolescents reported their age, gender, race/ethnicity, and current grades in school. Self-reported height and weight were also collected to calculate BMI percentiles for youth with respect to age and gender, based on the Centers for Disease Control and Prevention growth curves and growth charts for the United States (Ogden, Kuczmarski, Flegal, et al., 2002). BMI percentiles were then classified according to weight categories (i.e., healthy weight [<85th percentile], overweight [85th–95th percentile], obese [>95th percentile]).

2.2.2. Weight-based victimization

Adolescents were asked if they had ever been teased or bullied because of their weight at school. If they reported WBV, participants were then asked if they had experienced 19 specific instances of verbal, relational, physical, and cyber-bullying because of their weight (see Puhl et al., 2013). Responses were measured on 5-point Likert scales ("never"–"very often"). Individual experiences of WBV were averaged to indicate total frequency ($M = 2.34$, SD = .82, min = 1, max = 5, Cronbach's $\alpha = .94$). A linear regression model with frequency of WBV as the outcome variable, and BMI, age, race/ethnicity, grades, and camp as predictor variables revealed that the more often that students experienced WBV, the worse their grades were in school. No other notable differences were observed.

2.2.3. Preferred sources for WBV intervention

Adolescents' preferences for intervention in response WBV were assessed with 5 questions: "Would you want a peer to intervene if he/she saw or knew you were being teased or bullied because of your weight at school?" "Would you want a friend to intervene if he/she saw or knew you were being teased or bullied because of your weight at school?" "Would you want a teacher to intervene if he/she saw or knew you were being teased or bullied because of your weight at school?" "Would you want a PE teacher or sport coach to intervene if he/she saw or knew you were being teased or bullied because of your weight at school?" and "Would you want a parent to intervene if he/she saw or knew you were being teased or bullied because of your weight at school?" Responses were measured on 5-point Likert scales ("definitely not"–"definitely yes").

2.2.4. Diet and eating related variables

Questions pertaining to diet and eating behavior were derived from Project EAT (Eating Among Teens), a longitudinal investigation of factors related to eating habits, diet, and physical activity patterns among youth (Neumark-Sztainer et al., 2002).

Participants' weight control strategies during the previous year were assessed with 12 items from Project EAT. Responses were scored dichotomously ("yes"/"no"), and were subsequently categorized into "healthy" (exercised, ate more fruits and vegetables, ate less high-fat foods, ate less sweets; $\alpha = .56$) and "unhealthy" (fasted, ate very little food, food substitute, skipped meals, used diet pills, vomiting, laxatives, diuretics; $\alpha = .74$) weight control behaviors.

Binge eating was assessed by asking participants: "In the past year, have you ever eaten so much food in a short period of time that you would be embarrassed if others saw you (binge-eating)?" Responses were dichotomously scored ("yes"/"no").

2.2.5. Statistical analysis

Linear and logistic regression models were used to analyze the data. The variables "healthy weight control" and "unhealthy weight control" were based on Bartlett scores derived from tetrachoric principal-factor analyses. Specifically, tetrachoric correlations were computed for the 12 dichotomous weight control items (descriptive statistics for these variables are shown in Table 1). Factor loadings were then separately computed for the eight "healthy weight control" items and four "unhealthy weight control" items using a principal factor analysis with one pre-specified factor each. Scores for the two latent variables were then predicted from the factor loadings using the Bartlett method (Bartlett, 1938). Missing values for gender (16%, $n = 57$) were multiply imputed using a logistic regression imputation model to fill in binary gender values (see Rubin, 1987; $M = 20$ imputations). All analyses were carried out using Stata version 11.2.

3. Results

3.0.1. Participant characteristics

Table 1 summarizes sample statistics. Of 304 participants, 48% were female, and 52% were male. The average age was 16.25 years (SD = 1.25). Participants' self-reported race/ethnicity included Caucasian (71%), Black/African American (18%), and Other (11%). According to the BMI for age and gender classification, many participants (40%)

Table 1
Descriptive statistics of sample, intervention preferences and behaviors among youth.

Camp	%	N
Camp Shane	77	275
Well Spring	23	83
Race/Ethnicity		
White	71	257
Black	18	66
Other	11	38
Weight status		
Healthy weight	35	123
Overweight	25	87
Obese	41	143
WBV experienced		
No WBV experienced	36	130
Experienced WBV	64	231
Age (months)		
Desire for intervention	**% endorsement**	**(n = 215)**
Peers	58	
Friends	67	
Teacher	55	
PE teacher	45	
Parents	44	
Unhealthy weight control	**% endorsement**	**(n = 347)**
Fasted (going w/o food for > one meal)	28	
Ate very little food	44	
Took diet pills	20	
Made myself vomit (throw up)	14	
Used laxatives		
Used diuretics (water pills)	9	
Used food substitute (powder/special drink)	24	
Skipped meals	49	
Healthy weight control	**% endorsement**	**(n = 352)**
Exercise	78	
Ate more fruits and vegetables	71	
Ate less high-fat foods	62	
Ate less sweets	68	
	% endorsement	**(n = 357)**
Binge eating during past year	54	

were classified as "obese", with 24% of the sample categorized as "overweight", and 36% as "healthy weight".

3.1. Descriptive analyses

3.1.1. Weight-based victimization & desire for intervention

Most participants reported previous experiences of WBV (64%, $n = 231$). Adolescents who reported experiencing WBV were most likely to desire intervention from friends (67%) to help cope with WBV, followed by peers (58%) teachers (55%), PE teachers/sport coaches (45%), and parents (44%).

3.1.2. Eating- and weight-related behaviors

Healthy weight control behaviors were reported by the majority of participants, with exercise (78%) and "eating more fruits and vegetables" (71%), as the most highly endorsed strategies. Endorsement of unhealthy weight control behaviors was reported by 49% of adolescents. Over half of participants (54%) reported binge-eating in the last year, 20% reported using diet pills, and 14% vomited to lose weight or keep from gaining weight. For full descriptive results, see Table 1.

3.2. Model results

Separate linear and logistic regression models were constructed to assess the impact of WBV on weight control and binge eating behaviors (see Table 2, upper pane). According to linear regression models, adolescents who experienced WBV had a higher level of healthy, and especially unhealthy, weight control behaviors compared to youth with no history of WBV. Results of logistic regression models indicate that adolescents exposed to WBV also had a substantially higher likelihood of binge eating during the past year. Additionally, males had a lower likelihood of binge eating and were less engaged in weight control behaviors than females.

Desire for intervention was examined separately for each intervention agent (e.g., peers, parents, teachers) using logistic regression and controlling for participants' demographic characteristics (see Table 2, lower pane). For these models, only adolescents who experienced WBV were included ($n = 231$). Results indicate that adolescents who reported higher frequencies of WBV expressed an increased desire for intervention across all intervention sources. Healthy weight control behaviors did not predict intervention preferences, however, higher engagement in unhealthy weight control behaviors, corresponded to less desire for intervention across all sources.

3.3. Discussion

The current study is the first to document that unhealthy eating behaviors are associated with youth preferences for interventions in response to WBV. Results from this study indicate that adolescents who experience WBV are not only vulnerable to maladaptive eating patterns, but that engaging in unhealthy eating behaviors is related to less desire for intervention to cope with WBV from sources of support like friends and family. It may be that youth who experience WBV and engage in unhealthy eating behaviors are less likely to desire interventions from peers or trusted adults for fears that they may interfere with their unhealthy eating patterns or advocate for alternative, more adaptive coping strategies that do not involve attempts to lose weight. The findings of this study further imply that victims of WBV who engage in unhealthy eating behaviors could have heightened vulnerability to consequences of WBV and maladaptive coping strategies if they have less desire for intervention from others. More research is needed to further examine whether victims of youth who engage in unhealthy eating behaviors do in fact experience less supportive intervention from others, and to clarify the reasons for this.

3.3.1. Limitations & future directions

Several limitations should be noted. The sample was restricted to weight-loss treatment seeking adolescents, thus, additional research is needed to replicate the present findings both in treatment seeking and community samples of youth. It was unexpected that a third of our sample reported a BMI within the "healthy weight" range. However, the weight loss camps confirmed that a portion of enrollees had experienced significant weight-loss and had returned to camp for support with weight-loss maintenance. In addition, it was beyond the scope of this study to examine variables such as affect and emotional functioning, which may influence the relationship between WBV and preference for intervention among youth, and should be studied in future work.

4. Conclusions

WBV is pervasive and has negative consequences for adolescents who are targeted. Results of this study showed that almost half of adolescents who experienced WBV engaged in unhealthy eating behaviors, which corresponded with reduced desire for supportive intervention from peers and family. Ultimately, unhealthy eating behaviors could interfere with adolescents' ability to employ positive coping strategies, such as social support, in the face of victimization.

Table 2
Weight control and binge eating behavior, and desire for intervention source, in response to past WBV experiences—estimates from multiple regression models.

	Healthy weight control	Unhealthy weight control	Binge eating during past year
WBV: no	.	.	.
WBV: yes	0.289* (0.051, 0.528)	0.400*** (0.164, 0.636)	3.575*** (2.022. 6.326)
Female	.	.	.
Male	−0.501*** (−0.738, −0.264)	−0.672*** (−0.931, −0.413)	0.458* (0.250, 0.842)
N	340	336	344

	Intervention agent				
	Peers	Friends	Teachers	PE teachers	Parents
Frequency WBV	2.229*** (1.594, 3.116)	1.685** (1.206, 2.352)	1.463* (1.056, 2.025)	1.738** (1.248, 2.419)	1.552** (1.146, 2.102)
Healthy weight control	1.127 (0.831, 1.527)	1.102 (0.812, 1.494)	0.910 (0.647, 1.280)	0.926 (0.660, 1.296)	0.848 (0.625, 1.149)
Unhealthy weight control	0.578*** (0.424, 0.785)	0.511*** (0.367, 0.710)	0.652** (0.474, 0.896)	0.461*** (0.328, 0.647)	0.629** (0.470, 0.840)
Binge eating in past	1.245 (0.686, 2.261)	1.185 (0.651, 2.160)	0.911 (0.468, 1.776)	0.843 (0.436, 1.632)	1.025 (0.569, 1.846)
N	202	202	200	197	202

Note. WBV refers to weight-based victimization. Numbers shown in the upper panel are coefficients from linear regressions (weight control) and odds ratios from a binary logistic regression model (binge eating); 95% confidence intervals are shown in parentheses; weight control variables are standardized Bartlett scores derived from a tetrachoric principal factor analysis; numbers shown in the lower panel are odds ratios from ordered logistic regression models; dependent variables here are original Likert scales ranging from 1 ("definitely not") to 5 ("definitely yes"); the top two categories for teachers and PE teachers were collapsed due to small cell coverages; in both sets of models, shown in the upper and lower panels of the table, it was controlled for BMI, gender, race/ethnicity, age, grades, and camp; missing values for gender were multiply imputed using logistic regression ($M = 20$); significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

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Contributors

All authors made significant contributions to the study. KK conducted a review of the literature and drafted the manuscript; RP conceived of the study, and participated in its design and coordination and helped to draft the manuscript; JP participated in the design and coordination of data collection, developed the measurement, and helped to draft the manuscript; JL performed the statistics analyses and interpretation of the data, and helped to draft the manuscript. All authors read and approved the final manuscript.

Conflict of Interest

The authors have no conflicts of interest or relevant financial relationships to disclose.

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References

Bartlett, M. (1938). Methods of estimating mental factors. *Nature*, *141*, 609–610.

Bradshaw, C. P., Waasdorp, T. E., O'Brennan, L. M., & Gulemetova, M. (2011). Findings from the National Education Association's nationwide study of bullying: Teachers' and education support professionals' perspectivesIn N. E. Association (Ed.), .

Faith, M. S., Leone, M.A., Ayers, T. S., Moonseong, H., & Pietrobelli, A. (2002). Weight criticism during physical activity, coping skills, and reported physical activity in children. *Pediatrics*, *110*, e23–e31.

Haines, J., Neumark-Sztainer, D., Eisenberg, M. E., & Hannan, P. J. (2006). Weight teasing and disordered eating behaviors in adolescents: Longitudinal findings from Project EAT (Eating Among Teens). *Pediatrics*, *117*, 209–215.

Haines, J., Neumark-Sztainer, D., & Thiel, L. (2007). Addressing weight-related issues in an elementary school: What do students, parents, and school staff recommend? *Eating Disorders*, *15*, 5–21.

Haines, J., Neumark-Sztainer, D. R., Wall, M., & Story, M. T. (2007). Personal, behavioral and environmental risk and protective factors for adolescent overweight. *Obesity*, *15*, 2748–2760.

Jensen, C. D., & Steele, R. G. (2009). Brief report: Body dissatisfaction, weight criticism, and self-reported physical activity in preadolescent children. *Journal of Pediatric Psychology*, *34*, 822–826.

Lieberman, M., Gauvin, L., Bukowski, W. M., & White, D. R. (2001). Interpersonal influence and disordered eating behaviors in adolescent girls: The role of peer modeling, social reinforcement, and body-related teasing. *Eating Behaviors*, *2*, 215–236.

Menzel, J. E., Schaefer, L. M., Burke, N. L., Mayhew, L. L., Brannick, M. T., & Thompson, J. K. (2010). Appearance-related teasing, body dissatisfaction, and disordered eating: A meta-analysis. *Body Image*, *7*, 261–270.

Neumark-Sztainer, D., Falkner, N., Story, M., Perry, C., Hannan, P. J., & Mulert, S. (2002). Weight-teasing among adolescents: Correlations with weight status and disordered eating behaviors. *International Journal of Obesity*, *26*, 123–131.

Ogden, C. L., Kuczmarski, R. J., Flegal, K. M., Mei, Z., Guo, S., Wei, R., et al. (2002). Centers for Disease Control and Prevention 2000 growth charts for the United States: Improvements to the 1977 National Center for Health Statistics version. *Pediatrics*, *109*, 45–60.

Peterson, J. L., Puhl, R. M., & Luedicke, J. (2012). An experimental assessment of physical educators' expectations and attitudes: The importance of student weight and gender. *Journal of School Health*, *82*, 432–440.

Puhl, R. M., & Latner, J.D. (2007). Stigma, obesity, and the health of the nation's children. *Psychological Bulletin*, *133*, 557–580.

Puhl, R. M., & Luedicke, J. (2012). Weight-based victimization among adolescents in the school setting: Emotional reactions and coping behaviors. *Journal of Youth and Adolescence*, *41*, 27–40.

Puhl, R. M., Peterson, J. L., & Luedicke, J. (2012). Strategies to address weight-based victimization: Youths' preferred support interventions from classmates, teachers, and parents. *Journal of Youth and Adolescence*, *1–13*.

Puhl, R. M., Peterson, J. L., & Luedicke, J. (2013). Weight-based victimization: Bullying experiences of weight-loss treatment-seeking youth. *Pediatrics*, *131*, e1–e9.

Rubin, D. B. (1987). *Multiple imputation for nonresponse in sample surveys*. New York, NY: Wiley.