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# Associations between weight-related teasing and psychosomatic symptoms by weight status among school-aged youth

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### Objective

Weight-related teasing (WT) is associated with poor mental health. This study examined whether weight status moderates the relationship between WT and psychosomatic symptoms within a representative sample of school-aged youth.

### Methods

Data are from the Canadian 2013/2014 Health Behaviour in School-aged Children Survey, a nationally representative sample of youth in Grades 6–10. WT, psychosomatic symptoms and body mass index (BMI) were self-reported.

### Results

The final sample consisted of 20,277 youth (mean age = 14.2 years; 50.2% female). The prevalence who reported being WT at least once a week was 4.6%, 8.1% and 17.3% among youth with normal weight, overweight, and obesity, respectively ($p < 0.001$). There was a gradient relationship between the frequency of WT and psychosomatic symptoms ($p < 0.001$). By comparison to youth that were not WT, psychosomatic symptom z-scores were significantly ($p < 0.05$) higher in youth that were WT one to two times in the past few months (0.47, 95% CI: 0.41–0.53), two to three times per month (0.65, 0.52–0.77), about once a week (0.82, 0.71–0.93) and several times a week (0.98, 0.84–1.12). However, the WT * BMI category interaction term was not significant ($p = 0.86$).

### Conclusions

Victims of WT experienced more psychosomatic symptoms independent of BMI category; however, BMI category did not moderate the association between WT and psychosomatic symptoms.

Keywords:  adolescent, bullying, mental health, obesity.

## Introduction

Although young people are bullied for a variety of reasons, past studies indicate that the primary reason is their weight (1). Weight biases begin early in childhood (2), and negative weight-related attitudes exist as early as age three or four (3). Elementary school students with overweight and obesity experience stigma and increased bullying, which increases in severity and frequency as they enter middle school and remains highly prevalent throughout high school (2). Findings indicate that up to one in four young people are victims of weight-related teasing (WT) (4–6). Prevalences of WT are similar across race/ethnicity, but vary by gender, age and body mass index (BMI) status (4–6).

Weight-related teasing can negatively influence the mental health of youth. It is associated with an increase in the severity and frequency of anxiety and depressive symptoms (4,7). Youth living with obesity who are victims of WT are more likely to have a low self-esteem and poor body dissatisfaction than are youth living with obesity who are not victims of WT (2). Victims of WT are two to three times more likely to experience suicidal ideation (8). Poor mental health is an area of concern among youth given its rising prevalence (9) and relationship to psychiatric disorders in adulthood (10).

Overweight and obesity are highly prevalent conditions among youth across the globe, and a factor that needs warrants consideration is whether weight status moderates the relationship between WT and mental health. Although youth with overweight or obesity are more likely to be the victims of WT, WT occurs at all body shapes and sizes (4,5,11). At least two studies have considered whether weight status moderates the relationship between WT and mental health, and the findings from these studies are mixed. In a study of 2,793 youth (mean age = 14.4 years) from Minneapolis, MN, there was no evidence that weight status moderated the relationship between WT and symptoms of depression (12). Conversely, within 1,491 youth (mean age = 14.7 years) from Ottawa, Canada, the relationship between WT and depression scores was modestly stronger among youth with obesity ($r = 0.43$) than among youth with a normal weight ($r = 0.32$) (4). Given the scarcity and conflicting findings of this topic, further investigation is needed.

The primary objective of this study was to determine whether weight status moderated the relationship between WT victimization and psychosomatic symptoms within a large and representative sample of school-aged Canadian youth. Psychosomatic symptoms are a measure of mental well-being as the presence of these symptoms in the developing years contributes to the development of subsequent mental health conditions in adulthood (13). It was hypothesized that the relationship between WT and psychosomatic symptoms would be stronger among youth with overweight and obesity than among youth with a normal weight. Secondary objectives of this study were to estimate the prevalence of WT among Canadian youth and to determine whether WT varied by weight status.

## Methods

### Description of survey and study population

The World Health Organization Health Behaviour in School-Aged Children Study (HBSC) is a cross-sectional survey administered every 4 years to youth from 44 countries across Europe and North America (14). The results herein are based on the Canadian responses from the 2013/2014 HBSC cycle. The purpose of the HBSC is to collect data on health indicators among youth for the purpose of policy development and health research (14). The survey consists of an anonymous questionnaire completed by students in the classroom setting. All of the WT, mental health and covariate data used in the present study were obtained from this questionnaire. The Canadian HBSC followed the international HBSC protocol and used a cluster sampling approach with

school class as the primary sampling unit (15). The sample was designed to reflect the distribution of students in Grades 6–10 (approximately 11–15 years of age) across Canada according to school size, location, language and religion (15). The total sample included 30 107 youth. Youth with missing or invalid responses for WT ($N = 759$), psychosomatic symptoms ($N = 2$ 488), height or weight ($N = 7$ 144) or other covariates ($N = 3$ 117) were excluded from the current analysis. Thus, data were analyzed on a final sample of 20,277 youth. Consent was obtained and provided by school boards, individual schools, participants and their parents or guardians. Ethics approval was obtained from the Queen's University General Research Ethics Board.

### Survey methods

#### *Weight-related teasing measurement and classification*

The bullying items used in the HBSC are based upon the Olweus bully/victim questionnaire (16). The Olweus questionnaire has been widely used across the world (17), has been used in several cycle of the international HBSC survey and can be used to rapidly gather information on several different types of bullying. For these reasons, the Olweus bully/victim questionnaire was used in the 2013/2014 cycle of the HBSC. Previous literature supports the concurrent validity of the Olweus bully/victim questionnaire as it demonstrates that self-reported victimization is associated with peer nominations for victimization ($r = 0.42$, $p < 0.01$) (17). The questionnaire items also have good reliability, with Cronbach alpha reliability coefficients of 0.84 to 0.88 (18).

The Olweus bully/victim section of the HBSC questionnaire started by asking youth "How often have you been bullied at school in the past couple of months in the ways listed below." Among the list of several different types of bullying was a single item that captured WT. This item stated "Other students made fun of me because of my weight." Response options for this item were as follows: "I have not been bullied by other students in this way in the past couple of months," "once or twice," "2 or 3 times a month," "about once a week" and "several times a week." Participants were placed into one of five WT groups based upon which of these response options they selected.

#### *Psychosomatic symptoms*

The mental health outcome in this study consisted of psychosomatic symptoms, which collectively refer to psychological symptoms (i.e. feeling low, irritability, nervousness and difficulty getting to sleep) and subjective

physical complaints (i.e. headache, backache, stomachache and dizziness) that could occur because of the psychological symptoms (19). Psychosomatic symptom items were based on prior models that support the combination of psychological and somatic symptoms on a single scale (20). The psychosomatic checklist included in the HBSC has an acceptable internal consistency (Cronbach's alpha = 0.78) (20). To assess these symptoms, in the HBSC questionnaire, youth were asked "In the last six months, how often have you had the following: headache; stomachache; backache; feeling low (depressed); irritability or bad temper; feeling nervous; difficulties in getting to sleep; feeling dizzy?" Response options for each psychosomatic symptom were as follows: "about every day," "more than once a week," "about every week," "about every month" and "rarely or never". Based upon the responses to these eight symptoms, we used principal component analysis with a direct oblimin rotation to create a summary psychosomatic symptom $z$-score (using the Anderson–Rubin method). The factor analysis revealed a single component with an eigenvalue of 3.9.

### *Body mass index measurement and classification*

Height and weight were self-reported by youth and used to calculate the BMI. BMI values were converted to $z$-scores using age-specific and sex-specific growth references of the WHO (21). Overweight and obesity were defined as a BMI ≥1 standard deviation (SD) and ≥2 SD, respectively.

### *Covariates*

The following variables were considered potential confounders based on previous literature that examined the relationship between WT and mental health (4,7): age, gender, and ethnicity (i.e. White, Aboriginal, Arab and West Asian, Black, South Asian, East and Southeast Asian, Latin American and others including mixed ethnicity) (22). In addition, perceived family wealth (i.e. very well off, quite well off, average, not very well off and not at all well off) was considered a potential confounder based on evidence that socioeconomic status is a predictor of mental health among youth with obesity (23). Finally, immigration status (i.e. born in Canada, immigrated within the past 5 years and immigrated over 5 years ago) (24) was included.

### Statistical analysis

Statistical analyses were performed using SAS version 9.4 (SAS Inc, Cary, NC, USA) and accounted for the sample weights and clustered survey design. Basic descriptive data were calculated and presented in the paper as mean (SD) or $n$ (%). Ordinal logistic regression models were used to determine differences in WT across BMI categories after controlling for confounding variables. General linear models were used to determine differences in psychosomatic symptom $z$-scores across WT groups. This was performed within the entire sample and separately within the different BMI groups (i.e. normal weight, overweight and obese), both before and after controlling for confounding variables. To determine if the association between WT and psychosomatic symptoms varied by BMI category, a WT*BMI category interaction term was added to the regression models. All models satisfied the assumptions of normality and homogeneity of variance. A $p$-value <0.05 was used to determine if the parameter estimate for a specific exposure, confounding variable or interaction term was statistically significant. When comparing parameter estimates across models, we examined whether the 95% confidence intervals (CIs) for these parameter estimates overlapped to determine statistical differences.

## Results

A total of 20,277 Grade 6–10 students were included in the final sample (Table 1). The average age was 14.2 (SD = 1.4) years and 50.2% were female. The majority were Caucasian (68.0%) and born in Canada (81.4%). The prevalences of overweight and obesity were 18.6% and 8.9%, respectively.

As shown in Table 2, 12.9% of the sample reported being the victim of WT at least once in the past few months. The frequency of WT increased across normal weight, overweight and obese groups ($p < 0.001$). For instance, the proportion who reported being WT several times a week was 1.5% among youth with a normal BMI, 2.5% among youth with an overweight BMI and 7.0% among youth with an obese BMI. WT was more common in girls than boys in all BMI categories. For instance, 5.6% of boys and 9.6% of girls with an obese BMI reported being WT several times a week.

After adjusting for covariates, the relative odds of increasing frequency of WT in the full sample were 2.26 (95% CI = 1.95, 2.62) for youth with an overweight BMI and 4.32 (95% CI = 3.73, 5.01) for youth with an obese BMI by comparison to youth with a normal weight ($p$ for trend <0.0001). Because the BMI category*gender interaction term was statistically significant ($p = 0.01$), we explored the associations between BMI category and WT separately within boys and girls. Within boys, the relative odds of increasing frequency of WT were 1.85 (95% CI = 1.54, 2.23) for those with an overweight BMI

**Table 1** Descriptive characteristics of the study sample (*n* = 20,277)

|  | *n* | % |
|---|---|---|
| **Weight-related teasing frequency** |  |  |
| Not weight-teased | 16,833 | 83.0 |
| 1–2 times in past few months | 2,016 | 9.9 |
| 2–3 times per month | 581 | 2.9 |
| About once a week | 392 | 1.9 |
| Several times a week | 455 | 2.2 |
| **Gender** |  |  |
| Male | 10,134 | 49.8 |
| Female | 10,143 | 50.2 |
| **Ethnicity** |  |  |
| White | 13,861 | 68.0 |
| Aboriginal | 1,268 | 2.8 |
| Arab and West Asian | 263 | 1.5 |
| Black | 432 | 2.6 |
| East Indian and South Asian | 604 | 3.3 |
| East and Southeast Asian | 616 | 3.6 |
| Latin American | 140 | 1.0 |
| Other and mixed ethnicity | 3,093 | 17.3 |
| **Perceived family wealth** |  |  |
| Very well off | 4,238 | 21.8 |
| Quite well off | 6,742 | 34.7 |
| Average | 7,403 | 34.1 |
| Not very well off | 1425 | 7.1 |
| Not at all well off | 469 | 2.3 |
| **Immigration status** |  |  |
| Born in Canada | 16,561 | 81.4 |
| Immigrated past 5 years | 993 | 4.6 |
| Immigrated >5 years ago | 2,723 | 13.9 |
| **Body mass index** |  |  |
| Normal weight | 14,539 | 72.5 |
| Overweight | 3,829 | 18.6 |
| Obese | 1,909 | 8.9 |

and 3.89 (95% CI = 3.16, 4.79) for those with an obese BMI. The corresponding odds ratios for girls were 2.69 (95% CI = 2.21, 3.27) and 4.79 (95% CI = 3.73, 6.16), respectively. There was evidence of a linear trend between BMI category and WT within both genders (*p* for trend <0.0001).

After adjusting for BMI category and confounding variables, there was a gradient relationship between the frequency of weight teasing and psychosomatic symptoms (*p* for trend <0.001). By comparison to youth that were not WT, psychosomatic symptom *z*-scores were significantly (*p* < 0.05) higher in youth that were WT one to two times in the past few months (0.47, 95% CI: 0.41–0.53), two to three times per month (0.65, 0.52–0.77), about once a week (0.82, 0.71–0.93) and several times a week (0.98, 0.84–1.12). There was evidence that the association between WT and psychosomatic symptoms was weaker in boys than in girls (*p* for interaction = 0.04). Results of the gender stratified analyses exploring the association between WT and psychosomatic symptoms are presented in Table 3.

To determine if the association between WT and psychosomatic symptoms varied by BMI category, a WT*BMI category interaction term was added to the regression model. The interaction term was not significant (*p* = 0.86), suggesting that the association between WT and psychosomatic symptoms was not moderated by weight status.

## Discussion

This study examined the prevalence of WT, the relationship between WT and psychosomatic symptoms and determined whether this relationship varied according to BMI category. Analyses were performed on a large and representative sample of school-aged Canadian youth. Our findings suggest that the prevalence of WT increased with BMI such that 4.6%, 8.1% and 17.3% of youth with normal weight, overweight and obesity reported WT victimization at least two or three times a month. Youth who experience WT were more likely to report psychosomatic symptoms. However, contrary to our hypothesis, the relationship between WT and psychosomatic symptoms was not moderated by BMI category.

The prevalence of WT was lower in this large and Canadian-representative sample compared with previous estimates based on smaller and more homogeneous

**Table 2** Prevalence (%) of weight-related teasing according to weight status (*n* = 20,277)

| Weight-related teasing frequency | Full sample | | | Boys | | | Girls | | |
|---|---|---|---|---|---|---|---|---|---|
|  | Normal weight | Overweight | Obese | Normal weight | Overweight | Obese | Normal weight | Overweight | Obese |
| Not weight-teased | 87.1 | 77.9 | 62.4 | 88.8 | 83.1 | 66.3 | 85.5 | 71.1 | 55.5 |
| 1–2 times in past few months | 7.9 | 13.3 | 18.6 | 6.6 | 10.7 | 17.8 | 9.1 | 16.8 | 20.1 |
| 2–3 times per month | 2.2 | 3.3 | 7.1 | 2.0 | 2.1 | 6.0 | 2.4 | 5.0 | 9.2 |
| About once a week | 1.3 | 3.0 | 4.8 | 1.2 | 2.2 | 4.3 | 1.4 | 3.9 | 5.5 |
| Several times a week | 1.5 | 2.5 | 7.0 | 1.4 | 2.0 | 5.6 | 1.7 | 3.2 | 9.6 |

*Note*: values in each column add up to 100%.

**Table 3** Association between weight-related teasing, weight status and the confounding variables with psychosomatic health complaints (*n* = 20,277)

| Independent variable | Full sample | Boys | Girls |
|---|---|---|---|
| Weight-related teasing frequency | | | |
| Not weight-teased | 0 (referent) | 0 (referent) | 0 (referent) |
| 1–2 times in past few months | 0.47 (0.41, 0.53)** | 0.37 (0.28, 0.46)** | 0.54 (0.45, 0.63)** |
| 2–3 times per month | 0.65 (0.52, 0.77)** | 0.57 (0.40, 0.77)** | 0.70 (0.54, 0.85)** |
| About once a week | 0.82 (0.71, 0.93)** | 0.75 (0.58, 0.91)** | 0.88 (0.69, 1.07)** |
| Several times a week | 0.98 (0.84, 1.12)** | 0.81 (0.56, 1.07)** | 1.10 (0.92, 1.29)** |
| *P* for trend | <0.0001 | <0.0001 | <0.0001 |
| Weight status | | | |
| Normal weight | 0 (referent) | 0 (referent) | 0 (referent) |
| Overweight | −0.005 (−0.07, 0.07) | −0.02 (−0.11, 0.08) | −0.01 (−0.14, 0.12) |
| Obese | −0.05 (−0.11, 0.02) | −0.02 (−0.12, 0.07) | −0.08 (−0.20, 0.03) |
| Gender | | | |
| Boys | 0 (referent) | | |
| Girls | 0.48 (0.44, 0.53)** | N/A | N/A |
| Age | | | |
| Per each additional year | 0.10 (0.08, 0.11)** | 0.04 (0.02, 0.06)** | 0.16 (0.14, 0.18)** |
| Ethnicity | | | |
| White | 0 (referent) | 0 (referent) | 0 (referent) |
| Aboriginal | 0.04 (−0.06, 0.15) | 0.02 (−0.11, 0.14) | 0.10 (−0.06, 0.26) |
| Arab and West Asian | 0.002 (−0.16, 0.17) | 0.02 (−0.16, 0.18) | −0.05 (−0.31, 0.21) |
| Black | −0.20 (−0.34, −0.07)* | −0.25 (−0.38, −0.12)* | −0.13 (−0.37, 0.11) |
| East Indian and South Asian | −0.15 (−0.23, −0.06)* | −0.21 (−0.33, −0.09)* | −0.10 (−0.22, 0.02) |
| East and Southeast Asian | −0.08 (−0.17, 0.01) | 0.06 (−0.09, 0.22) | −0.19 (−0.31, −0.07)* |
| Latin American | 0.02 (−0.26, 0.29) | 0.17 (−0.21, 0.55) | −0.13 (−0.38, 0.12) |
| Other | 0.03 (−0.03, 0.08) | 0.01 (−0.06, 0.08) | 0.04 (−0.03, 0.11) |
| Perceived family wealth | | | |
| Very well off | 0 (referent) | 0 (referent) | 0 (referent) |
| Quite well off | 0.14 (0.10, 0.19)** | 0.10 (0.04, 0.16)* | 0.18 (0.11, 0.25)** |
| Average | 0.36 (0.31, 0.41)** | 0.29 (0.22, 0.37)** | 0.41 (0.32, 0.49)** |
| Not very well off | 0.69 (0.61, 0.78)** | 0.60 (0.50, 0.70)** | 0.76 (0.63, 0.89)** |
| Not at all well off | 0.56 (0.36, 0.76)** | 0.51 (0.26, 0.76)** | 0.57 (0.32, 0.85)** |
| Immigration status | | | |
| Born in Canada | 0 (referent) | 0 (referent) | 0 (referent) |
| Immigrated within 5 y | −0.09 (−0.18, 0.01) | 0.02 (−0.10, 0.13) | −0.20 (−0.33, −0.07)* |
| Immigrated >5 y | −0.06 (−0.11, −0.001) | 0.06 (−0.12, 0.01) | −0.04 (−0.13, 0.05) |

Data presented as adjusted ß coefficients (95% confidence intervals).
*$p < 0.01$.
**$p < 0.0001$.

samples (4,5). Methodological differences in the methods used to measure and classify WT may, in part, account for this discrepancy. For instance, one study reported that 29% of youth in Ottawa, Ontario, reported WT when defined as *a little teasing or more* (4). Another study found that 25% of youth in Minneapolis, MN, reported being the victim of WT at least *a few times per year* (5). Our lowest response option for WT was *one to two times in the past few months*, and this may represent a more severe degree of WT than was captured in these earlier studies, which could account for the lower prevalence of WT.

Our finding that there was a graded increase in the prevalence of WT with increasing BMI is consistent with previous literature examining bullying among youth with overweight and obesity (25) and aligns with evidence of weight-discrimination among youth (26). Negative labels and attitudes are often assigned to peers with overweight and obesity as early as age three or four (13), and these biases are often maintained throughout development (2). Presumably, weight-related biases become more salient at higher BMI levels and contribute to the increased odds of WT at higher BMI categories. This finding is important given our finding and the findings from several previous studies (2,4,5,7,8) that WT is associated with poor mental health outcomes within young people. In fact, in our study, being WT once a week or several times a week

was a stronger predictor of psychosomatic symptoms than all of the covariates examined in the regression models including age, gender, BMI category, ethnicity, immigration status and perceived family wealth.

The frequency of WT was greater among girls than boys; this sex difference in youth is supported by previous findings (4,5). The associations between WT and BMI with psychosomatic symptoms also tended to be stronger in girls compared with boys. This finding is in line with prior research suggesting that girls are more bothered by WT than boys in all BMI categories (5), and that rumination may mediate the relationship between victimization and psychological impairment (27). Furthermore, girls experience greater body dissatisfaction than boys during development (28), which contributes to poor mental health (29). This is likely exacerbated by negative portrayals of body image by Western media, which predicts body dissatisfaction among girls because of an increased desire for thinness (30).

A primary finding of our study was that the relationship between WT and psychosomatic symptoms was not moderated by BMI category. This finding is consistent with previous research in a sample of youth from Minneapolis, MN (12). However, our results contrast prior data from 1,491 youth in Ottawa, Canada, which suggested that the relationship between peer-related WT and symptoms of depression increase with increasing BMI status (4). The regional sample in Ottawa did not reflect the general population thereby conflicting with our findings from a nationally representative sample.

The longitudinal effects of growth and development contributed to our results. The psychosomatic effects of WT among youth may depend on relative shifts in weight status rather than absolute body weight at any one point in time. However, our study design did not allow us to examine weight status over time. Further research using a longitudinal study design is required to test this hypothesis.

A primary strength of this study is the large, nationally representative sample of Canadian youth that makes the findings generalizable to Canadians of the same age. This afforded the current analysis with adequate statistical power to explore WT*BMI category interactions. We also controlled for several potentially important confounders including age, ethnicity, family wealth and immigration status. The use of a valid and reliable measure of psychosomatic symptoms in youth is another strength. This measure provided a broader indication of mental health in contrast to diagnostic measures of mental well-being.

Our study also has several limitations. The cross-sectional design limits the ability to make causal inferences about the observed associations between the WT exposure and psychosomatic symptoms outcome.

Furthermore, the exposure and outcome captured different time periods (i.e. WT was based on the past couple of months while psychosomatic symptoms was based on the last six months). The use of self-reported measures may have introduced biases, such as with the measurement and classification of BMI. Previous literature suggests that youth tend to under-report height and weight (31). However, self-report measures permitted the use of a large, representative sample, and so this limitation was considered as an acceptable trade-off for the current study. This self-reported data may have also led to residual confounding. Athough we considered several relevant confounding variables, there may have been others that we could not control for. Finally, while it has been suggested that being both a victim and perpetrator of WT is associated with psychosomatic symptoms, an examination of the perpetrators of WT was not possible because of the limited statistical power; <1% of youth reported being perpetrators of WT.

## Conclusion

Youth who are weight-teased experienced more psychosomatic symptoms, independent of BMI category. However, BMI category did not moderate the association between WT and psychosomatic symptoms. Future research on WT and mental health should consider employing a longitudinal study design and consider assessing whether WT mediates the link between BMI and mental health.

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