



High School Bullying and Mental Disorder: an Examination of the Association with Flourishing and Emotional Regulation

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Abstract

Bullying behaviours are shown to be associated with symptoms of affective disorder; however, there is limited evidence of these associations in a Canadian high school context. We sought to examine the relationship between psychosocial characteristics of high school youth, their bullying involvement, and their self-reported symptoms of anxiety and depression. Logistic regression was conducted using data from year 5 of the COMPASS Study, a large behavioural health survey of Canadian students in grades 9 to 12. Data were used from 6,585 students who participated in a pilot test introducing a new Mental Health-Module (MH-M). One third of students in our sample reported clinically-relevant symptoms of anxiety, and over 40% reported symptoms of depression. Approximately 20% of students reported involvement in bullying as victims, perpetrators, or victim-perpetrators. Overall, being involved in bullying as a victim or victim-perpetrator was associated with increased likelihood of anxiety and depression, but this was not observed for perpetration. Measures of mental wellbeing and emotional regulation skills were also significantly associated with clinically relevant symptoms of anxiety and depression among students in our sample, and were shown to partially mediate the relationship between bullying and mental disorder. Further research is needed to investigate the protective effects of positive mental wellbeing and socio-emotional skills on mental disorder, within high school bullying contexts. School-based prevention efforts that aim to foster emotional intelligence and improve flourishing among youth may be most effective in addressing the psychological burdens of bullying involvement.

Keywords Bullying · Mental health · Adolescent health · Mental disorders

Mental disorders represent the leading cause of disability among youth worldwide (Murray et al. 2012). In Canada, adolescents experience higher rates of mental disorder than any other age group (Pearson et al. 2013). Over one third of Ontario high school students indicate moderate-to-severe levels of psychological distress or poor mental health (Boak

et al. 2016). The onset of commonly observed mental disorders, such as anxiety and depression, varies in that the causes of psychopathologies may be intrinsic and/or triggered by environmental factors such as abuse, trauma, and victimization from bullying (Hasler 2010; Laugharne et al. 2010). These factors may also influence bullying involvement, which has been shown to be associated with affective disorders in previous research (Kaltiala-Heino et al. 2000; Swearer et al. 2001; Klomek et al. 2007; Van der Wal et al. 2003).

Bullying is a highly prevalent phenomenon among youth in Canada. The act of bullying itself is considered intentional aggression towards others, often repeated over time, involving a perceived power imbalance (Olweus 1996). Carlyle and Steinman demonstrate the importance of distinguishing between types of school-based bullying involvement (e.g. victimization, perpetration), as their occurrence may vary by demographic characteristics among student populations (Carlyle and Steinman 2007). Previous researchers have identified female adolescents as more likely to report being victims of

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bullying than males, while bullying perpetrators are more likely to be male (Stubbs-Richardson et al. 2018). Bullying involvement is also associated with age and grade, with prevalence being higher among students in younger grades (Due et al. 2005; Brown et al. 2005), as well as lower socioeconomic status (Tippett and Wolke 2014). Race-based bullying has also been observed across high school settings. In Canada, a highly multicultural country, ethnic composition and school diversity are shown to play a role in bullying involvement among students (Vitoroulis et al. 2016). This is particularly true for bullying victimization, which may be buffered by higher representation of ethnic minority peers within schools (Vitoroulis et al. 2016). Consideration of such demographic characteristics may help elucidate the patterns of bullying which contribute to anxiety and depression.

Bullying victimization and perpetration may also be associated with certain psychological characteristics, which may further the association between bullying and mental disorders. Psychosocial and emotional wellbeing may influence both bullying involvement as well as experiences of mental disorders, suggesting the relationship between bullying involvement and common affective disorders such as anxiety and depression is highly complex. For instance, bullying victimization and perpetration each correspond to particular social dynamics and are associated with emotional wellbeing and emotional regulation skills in different ways (Kaltiala-Heino and Fröjd 2011). Previous studies have suggested that victimization may contribute to emotional dysregulation and low self-esteem, which may mediate the relationship between being bullied and experiencing a mental disorder (McLaughlin et al. 2009; Turner et al. 2010). Affective disorders have also been shown to distort perceptions of social interactions (Prinstein et al. 2005); therefore, impairing the development of important social skills that help victims defend themselves from bullying and/or remain emotionally unscathed after such interactions (Kaltiala-Heino and Fröjd 2011; Lewinsohn et al. 1998).

Bullying perpetrators have been shown to possess poor emotional regulation skills; previous authors have cited emotional dysregulation as a possible mechanism of perpetration behaviour (Cosma et al. 2014; Basharpour et al. 2013), and others have identified mental wellbeing and resilience as protective against overall bullying involvement (Hinduja and Patchin 2017). However, the prevalence of affective disorders among perpetrators remains controversial; recent evidence suggests that perpetrators of bullying demonstrate high levels of related constructs such as self-esteem and social intelligence (Pollastri et al. 2010; Andreou 2006). Furthermore, students who are simultaneously victims and perpetrators of bullying may represent a unique subset of bullying-involved students (Lereya et al. 2015); however, there is limited evidence

addressing the impact that victim-perpetration has on mental health among Canadian high school students.

Despite the existing evidence outlined above, literature examining the association between bullying involvement and mental disorders remains limited and requires further attention—particularly within a Canadian high school context. To our knowledge, there have been no relevant previous analyses of bullying involvement or bullying-related factors that may predict both anxiety and depression within this population, while considering students' overall psychosocial wellbeing and emotional intelligence. As such, our objectives are threefold; among a large sample of Canadian students in grades 9 through 12, we sought to: (1) estimate the prevalence of self-reported and clinically relevant symptoms of affective disorders, namely anxiety and depression; (2) estimate the prevalence of bullying victimization, perpetration, and victim-perpetration, as well as the average frequency at which students report these bullying events; and, (3) to examine the interrelationships among demographic and psychosocial characteristics of high school youth, their bullying involvement, and their self-reported symptoms of anxiety and depression. A secondary aim of this study is to explore the mediating effects of psychosocial and emotional wellbeing on the relationship between bullying involvement and mental disorder.

Methods and Analysis

Study Design

We conducted this investigation using data from the COMPASS Study (www.compass.uwaterloo.ca), a large prospective cohort study of Canadian high school students in grades 9 through 12 (Leatherdale 2014). Each year, all students from participating schools are invited to complete a health behaviour questionnaire during class time. All recruitment and participation procedures have received approval from the University of Waterloo Office of Research Ethics and participating school boards. Detailed information on the methodology of the COMPASS Study is available elsewhere (Leatherdale 2014).

In year 5 of the COMPASS Study (Y₅[2016–2017]), a subset of schools ($n = 14$) participated in a pilot test introducing a new Mental Health-Module (MH-M). Participating COMPASS schools have previously identified their students' mental health as a priority (Patte et al. 2017a), and the addition of the MH-M reflects a new capacity to evaluate and improve mental health policies and programs within the context of the high school environment. More information on the development, design, and testing of the MH-M is available (Patte et al. 2017a, b).

Sample

Nine schools in Ontario and five schools in British Columbia participated in the MH-M pilot in Y₅. Refer to Patte et al. (2017b) for a comparison between Ontario and British Columbia MH-M pilot test samples. Schools were recruited based on expressed interest. All grade 9–12 students within these 14 schools ($N = 10,869$) were invited to participate and $N = 8,344$ students completed the student questionnaire (77% response rate). Active-information passive-consent procedures were used to reduce school burden, promote anonymity and response rates, and are shown to be important for collecting robust behavioural health data in youth (White et al. 2004; Hollmann and McNamara 1999; Shaw et al. 2015; Gallagher et al. 2010). Missing students was primarily attributed to absenteeism and spare study periods; fewer than 1% of eligible students were actively withdrawn from the MH-M pilot by a parent or guardian. A total of $N = 8,216$ individuals remained after cases with missing demographic data were excluded. After removing students with missing exposure and outcome data (20% of cases), a complete-case sample of $N = 6,585$ was available for final analysis. Supplementary File A presents an analysis predicting the likelihood of missing responses in measures of bullying and mental health across all sociodemographic measures.

Measures

Anxiety and Depression The MH-M included the Generalized Anxiety Disorder 7-item Scale (GAD-7) (Spitzer et al. 2006) and the Centre for Epidemiologic Studies Depression Scale (Revised)-10 (CESD-R-10) (Van Dam and Earleywine 2011) as measures of self-reported anxiety and depression symptoms, respectively. For the GAD-7, students were asked questions pertaining to the frequency of anxiety-related problems they may have experienced in the last 2 weeks, such as uncontrollable worrying and trouble relaxing. Students responded to each item on a 4-point Likert scale (0 = not at all, 3 = nearly every day) with possible score sums ranging between 0 and 21; higher scores indicate greater impairment. The CESD-R-10 was used as a self-reported measure of past-week depression symptoms (e.g. feelings of sadness, loneliness, and trouble concentrating) using a 4-point Likert scale (0 = none or less than 1 day, 3 = 5–7 days). Score sums ranged from 0 to 30, and higher scores indicated greater impairment. Internal consistency of the GAD-7 and CESD-R-10 scales were robust ($\alpha = .99$ and $\alpha = .98$, respectively). Students were categorized as having clinically relevant anxiety or depression symptoms present at the time of the questionnaire (GAD-7/CESD-R-10 score ≥ 10).¹ These thresholds are consistent with

existing research, where both the GAD-7 and CESD-R-10 have been previously validated among non-clinical youth samples (Haroz et al. 2014; Cartierre et al. 2011; Bradley et al. 2010; Mossman et al. 2017).

Bullying Four bullying-related items on the COMPASS, questionnaires were used to derive a single measure inclusive of bullying involvement and frequency. To identify bullying victims, students were asked, “In the last 30 days, in what ways were you bullied by other students?” and were instructed to select all applicable items from a list of bullying subtypes (physical attacks, verbal attacks, cyber-attacks, and theft or damage of belongings) alongside the response option: “I have not been bullied in the last 30 days.” A similar question was asked to identify bullying perpetrators: “In the last 30 days, in what ways did you bully other students?” whereby students were instructed to select all applicable items from the same list of bullying subtypes. Responses to these two questions were collapsed and dichotomized, then used to categorize students as either uninvolved, victims, perpetrators, or victim-perpetrators (i.e. students who reported both victimization and perpetration).

To capture bullying frequency, students were asked the following questions: “In the last 30 days, how often have you been bullied by other students?” and “...how often have you taken part in bullying other students?” Response options included the following: “less than once a week”, “about once a week”, “2 or 3 times a week”, “daily or almost daily”, and “I have not been bullied in the last 30 days” or “I did not bully other students in the last 30 days”. Frequency was categorized as less than once per week or at least once per week in the last 30 days. Using student measures of bullying involvement (uninvolved, victim only, perpetrator only, victim-perpetrator) and frequency ($\geq 1/\text{week}$, $< 1/\text{week}$), we created one composite variable that categorized students according to the frequency of their involvement as follows: (1) uninvolved ($N = 5112$), (2) victim only, $< 1/\text{week}$ ($N = 480$), (3) victim only, $\geq 1/\text{week}$ ($N = 364$), (4) perpetrator only, $< 1/\text{week}$ ($N = 136$), (5) perpetrator only, $\geq 1/\text{week}$ ($N = 62$), (6) victim-perpetrator only, $< 1/\text{week}$ ($N = 126$), and (7) victim-perpetrator only, $\geq 1/\text{week}$ ($N = 208$). Students who reported both victimization and perpetration, but who reported different frequencies for each ($N = 124$), were categorized according to their reported perpetration frequency by default.

¹ We first tested the use of GAD-7 and CESD-R-10 as continuous measures (not shown in this study), which produced similar results as when these variables were treated as binary (i.e. *Ref.* = GAD-7/CESD-R-10 score < 10). We therefore opted to report results using these thresholds to better enable meaningfulness and interpretability of self-reported symptoms of anxiety and depression among students (e.g. for use by stakeholders, practitioners).

Flourishing and Emotion Regulation The Flourishing Scale (FS) developed by Diener et al. (2010) was used as a measure of self-reported psychosocial functioning and overall wellbeing, where students rated their agreement with statements pertaining to factors such as optimism, self-esteem, and sense of purpose in life. Examples of statements include, “I am a good person and live a good life” and “I am engaged and interested in my daily activities”. In the MH-M, the 8-item FS was modified to better suit our large school-based study by using a 5-point Likert scale (1 = strongly agree, 5 = strongly disagree) with a possible sum score ranging from 8 to 40. Along a flourishing-languishing continuum, scores are associated with what are considered to be protective mental health resources and strengths (Diener et al. 2010). To maintain consistency with the directionality of other mental health measures in this study, the FS was reverse coded; as such, lower scores are indicative of student flourishing, while higher scores indicate languishing, or poor overall mental wellbeing. Internal consistency was high ($\alpha = .98$).

The MH-M also incorporated an indicator of socio-emotional skills using a modified version of the difficulties in emotion regulation scale (DERS) (Gratz and Roemer 2004), a self-report tool that has been validated for assessing emotional intelligence and regulation problems among adolescents (Neumann et al. 2010; Perez et al. 2012; Weinberg and Klonsky 2009). Six items from the full DERS (1 item from each of the 6 subscales) were chosen based on highest loading items in previous factor analyses conducted among youth (Neumann et al. 2010; Perez et al. 2012; Weinberg and Klonsky 2009). Using a 5-point Likert scale (1 = almost never, 5 = almost always), students were asked to indicate how often the following items applied to them: “I have difficulty making sense out of my feelings”, “I pay attention to how I feel”, “when I’m upset, I have difficulty concentrating”, “when I’m upset, I believe there is nothing I can do to make myself feel better”, “I lose control over my behavior”, and “when I’m upset, I feel ashamed for feeling that way”. Total score sums range from 6 to 30, and higher scores are indicative of greater difficulties in emotion regulation skills, which may be predictive of socio-emotional dysfunction (Gratz and Roemer 2004). We detected high internal consistency ($\alpha = .99$).

Sociodemographic Covariates Students reported their sex (male or female), race/ethnicity (dichotomized as white or non-white), and school grade (9, 10, 11, or 12). Due to its high correlation with grade, age was not used as a covariate in our analysis. Instead, school grade is used given the relevance to school stakeholders who are tasked with implementing school-based programs and interventions targeting bullying and mental health. As a proxy to socioeconomic status or indicator of part-time employment, students were also asked how much money they usually receive per week to spend on

themselves or save. Responses were categorized as \$0, \$1–20, \$21–100, \$101+, and “do not know”.

Data Analysis

Comparisons across bullying groups were made using χ^2 , t , and one-way ANOVA tests. We used logistic regression to test how bullying involvement and frequency were associated with clinically relevant anxiety (model I) and depression (model II) symptoms among students, while controlling for sociodemographic characteristics (sex, grade, ethnicity, spending money), mental wellbeing (FS), and emotional regulation (DERS Items). To account for comorbidity between anxiety and depression in our sample, CESD-R-10 was included in model I and GAD-7 was included in model II. Adjusted odds ratios were reported alongside 95% confidence intervals. The intraclass correlation coefficient (ICC) was calculated for each outcome variable (GAD-7, CESD-R-10) and only a marginal amount of within-school variation was detected ($ICC_{GAD-7} = .012$ and $ICC_{CESD-R-10} = .013$). As such, we did not adjust for school-level clustering in our models.

An exploratory meditation analysis was conducted according to the hypothetical pathway diagrams shown in Fig. 1. Using a series of regressions and the Sobel test (MacKinnon et al. 2012), four models were estimated to individually test the mediating effects of FS and DERS scores on the association between self-reported bullying involvement (uninvolved, victim only, perpetrator only, victim-perpetrator) and both outcome variables (clinically relevant symptoms of anxiety and depression). Analyses were conducted using SAS 9.4 (SAS Institute 2016).

Results

Comparing Students with Missing and Complete Data

Missing data analysis results are presented in Supplementary Table A. Compared to students in grade 9, those in grades 11 and 12 were less likely to have omitted at least one item on the GAD-7/anxiety scale, while non-white students were 1.39 times more likely to not respond. Students who did not know their weekly spending amount were 5.09 times more likely to also have missing responses for bullying victimization. Students with clinically relevant symptoms of anxiety were also 2.50 times more likely to not respond to the bullying victimization measure. We found no differences among students with and without missing bullying perpetration and CESD-R-10/depression items.

Student Characteristics and Bullying Involvement

Over half of students were female (53%) and 78% self-identified as white. Clinically relevant symptoms of anxiety

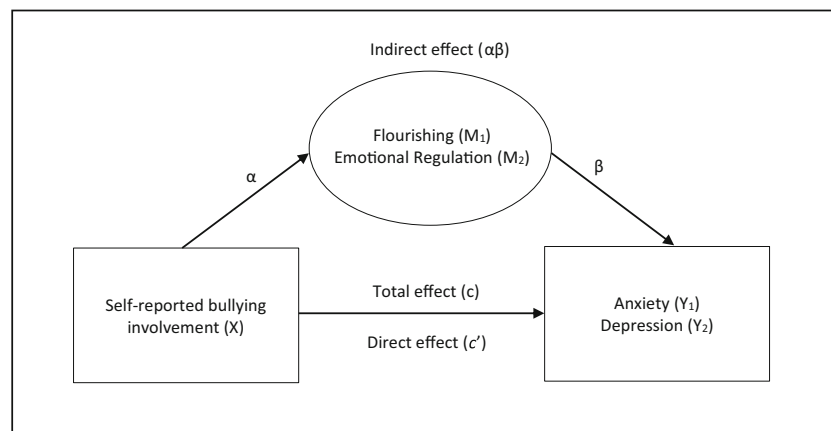


Fig. 1 Simplified hypothetical mediation model showing the direct, indirect, and total effects of anxiety and depression symptoms among bullying victims, perpetrators, and victim-perpetrators in the COMPASS MH-M Pilot Study (2016–2017), via flourishing and emotional regulation. Note: The total effect (c) is the effect of bullying involvement (victim, perpetrator, victim-perpetrator) on clinically-relevant symptoms of anxiety (Y_1 : GAD-7 score ≥ 10) and depression (Y_2 : CESD-

R-10 score ≥ 10) with the inclusion of flourishing (M_1 : FS score) or emotional regulation (M_2 : DERS score). The direct effect (c') is the effect of bullying involvement on clinically-relevant symptoms of anxiety and depression without the inclusion of flourishing or emotional regulation. The indirect effect ($\alpha\beta$) is the effect of bullying involvement on clinically relevant symptoms of anxiety and depression via flourishing or emotional regulation. Refer to Table 3 for the results of each model tested

were less prevalent than symptoms of depression (32% vs. 41%), while 27% of students reported clinically relevant symptoms of both. Mean FS (flourishing) and DERS (emotional regulation) scores were 16.64 (SD = 5.85) and 14.77 (SD = 5.08), respectively. Females were more likely to report symptoms of anxiety, $\chi^2(1, N = 1455) = 441.27, p < .0001$, and depression, $\chi^2(1, N = 1731) = 316.13, p < .0001$, compared to males, and, on average, also scored higher on the FS, $t(6315) = 8.39, p < .0001$, and DERS, $t(6292) = 19.36, p < .0001$. Twenty-one percent of students reported being involved in bullying in the past 30 days.

Table 1 depicts descriptive comparisons of student characteristics across bullying involvement. As seen, 13% of all students reported being victims of bullying only, 3% reported being perpetrators only, and 5% reported both victimization and perpetration (victim-perpetrators) in the last 30 days. Among victims, 55% reported anxiety while 68% reported depression; on average, victims scored highest on the DERS ($M = 17.46, SD = 5.43$). The victim-perpetrator group had the poorest average FS score ($M = 19.83, SD = 7.36$). A smaller proportion of victim-perpetrators reported anxiety (49%) than depression (66%), and fewer perpetrators reported anxiety (27%) while 39% reported depression. Overall, perpetrators and uninvolved students reported similar prevalence of clinically relevant anxiety and depression symptoms. Differences were also observed across bullying groups with respect to frequency of bullying; most victims and perpetrators reported frequencies of less than once per week (57% and 69%, respectively), yet a majority of victim-perpetrators reported involvement of once a week or more (62%).

Predicting Anxiety and Depression

Results of our logistic regression models are presented in Table 2 for anxiety (GAD-7 score ≥ 10) and depression (CESD-R-10 score ≥ 10). In general, students in higher grades were more likely to report clinically relevant symptoms of anxiety and depression compared to students in grade 9. Females consistently had higher odds of scoring ≥ 10 on the GAD-7/anxiety and CESD-R-10/depression than males. Students who identified as non-white had lower odds of clinically relevant anxiety symptoms.

Measures of mental wellbeing and emotional regulation skills were also significantly associated with clinically relevant symptoms of anxiety and depression among students in our sample, while holding all variables constant. Results in Table 2 indicate that for every unit increase in the FS, students were 3% and 17% more likely to score ≥ 10 on the GAD-7/anxiety and CESD-R-10/depression, respectively. Similarly, for every unit increase along the DERS, students were 24% more likely to score ≥ 10 on the GAD-7/anxiety and 28% more likely to score ≥ 10 on the CESD-R-10/depression.

With respect to self-reported bullying involvement and frequency, students who were victims had generally higher odds of reporting anxiety and depression than students who were not involved (Table 2). Victim-perpetrators who reported overall involvement of less than once a week were 1.80 times more likely to score ≥ 10 on the CESD-R-10/depression, while those who reported more frequent involvement (≥ 1 /week) were 1.95 and 2.57 times more likely to report scoring ≥ 10 on the GAD-7/anxiety and CESD-R-10/depression, respectively. Students who reported perpetration alone did not

Table 1 Descriptive comparisons (using Chi-square and one-way ANOVA) of bullying involvement and student characteristics, among COMPASS students in the MH-M Pilot Study (2016–2017)

Measure	Uninvolved <i>N</i> (%)	Victims <i>N</i> (%)	Perpetrators <i>N</i> (%)	Victim- perpetrators <i>N</i> (%)	χ^2, F	<i>df</i>	<i>p</i>
Grade					<i>26.50</i>	<i>9</i>	<i>.002</i>
9 (ref.)	1377 (27)	278 (33)	49 (25)	104 (31)			
10	1501 (29)	259 (31)	59 (30)	87 (26)			
11	1248 (24)	191 (23)	50 (25)	82 (24)			
12	986 (19)	116 (14)	40 (20)	61 (18)			
Sex					<i>115.61</i>	<i>3</i>	<i>< .0001</i>
Female (ref.)	2614 (51)	540 (64)	50 (25)	146 (44)			
Male	2498 (49)	304 (36)	148 (75)	188 (56)			
Ethnicity					<i>27.27</i>	<i>3</i>	<i>< .0001</i>
White (ref.)	3938 (77)	713 (84)	145 (73)	251 (75)			
Non-white	1174 (23)	131 (15)	53 (27)	83 (25)			
Weekly spending money					<i>55.53</i>	<i>12</i>	<i>< .0001</i>
Zero (ref.)	808 (16)	134 (16)	21 (11)	37 (11)			
\$1 to \$20	1340 (26)	266 (32)	36 (18)	92 (28)			
\$21 to \$100	1327 (26)	176 (21)	52 (26)	88 (26)			
\$100+	978 (19)	176 (21)	67 (34)	80 (24)			
Do not know	659 (13)	92 (11)	22 (11)	37 (11)			
GAD-7/anxiety					<i>319.86</i>	<i>3</i>	<i>< .0001</i>
No (score < 10)	3739 (73)	378 (45)	145 (73)	170 (51)			
Yes (score ≥ 10)	1373 (27)	466 (55)	53 (27)	164 (49)			
CESD-R-10/depression					<i>406.58</i>	<i>3</i>	<i>< .0001</i>
No (score < 10)	3297 (65)	268 (32)	120 (61)	114 (34)			
Yes (score ≥ 10)	1815 (35)	576 (68)	78 (39)	220 (66)			
FS ^a					<i>96.73</i>	<i>3</i>	<i>< .0001</i>
Mean (SD)	16.05 (5.53)	18.98 (6.22)	16.47 (5.19)	19.83 (7.36)			
DERS Items ^b					<i>130.36</i>	<i>3</i>	<i>< .0001</i>
Mean (SD)	14.17 (4.84)	17.46 (5.43)	14.63 (4.67)	17.12 (5.07)			
Bullying frequency					<i>55.60</i>	<i>2</i>	<i>< .0001</i>
< 1/week (ref.)	–	480 (57)	136 (69)	126 (38)			
≥ 1/week	–	364 (43)	62 (31)	208 (62)			
Total	5112 (78.8)	844 (13.0)	198 (3.1)	334 (5.1)			

Ref., reference category; *SD* standard deviation. Italicized values indicate statistical significance at $\alpha < .01$

^a For the purposes of this study, the Flourishing Scale (FS) was changed to a 5-point Likert scale and was reverse-coded. Higher scores indicate poor overall wellbeing. Scores range from 8 to 40

^b We used 6 items from the difficulties in emotional regulation scale (DERS), 1 from each of the 6 subscales. Scores range from 6 to 30

report higher odds of anxiety or depression compared to uninvolved students.

The Mechanistic Role of Flourishing and Emotional Regulation

Table 3 presents the results of the analysis used to estimate the four mediating models shown in Fig. 1. The results suggest

that bullying involvement as a victim or victim-perpetrator was associated with an increase in mean FS score, which in turn was associated with increased risk of both clinically relevant anxiety (model I) and depression (model II) symptoms. Likewise, bullying involvement across all roles was shown to be associated with increasing DERS scores; unit increases in mean DERS were associated with increased risk in anxiety (model III) and depression (model IV).

Table 2 Logistic regression models predicting symptoms of anxiety and depression among COMPASS students in the MH-M Pilot Study (2016-2017)

Measure	Model I		Model II	
	AOR	95% CI	AOR	95% CI
Grade				
9 (<i>ref.</i>)	1.00		1.00	
10	1.04	[0.85, 1.28]	1.45***	[1.18, 1.78]
11	1.36**	[1.10, 1.69]	1.74***	[1.40, 2.16]
12	1.21	[0.95, 1.53]	1.74***	[1.37, 2.20]
Sex				
Female (<i>ref.</i>)	1.00		1.00	
Male	2.45***	[1.92, 2.62]	1.36***	[1.16, 1.58]
Ethnicity				
White (<i>ref.</i>)	1.00		1.00	
Non-white	0.80*	[0.67, 0.96]	1.15	[0.97, 1.37]
Self-reported bullying involvement, by frequency				
Uninvolved (<i>ref.</i>)	1.00		1.00	
Victim only, <1/week	1.26	[0.97, 1.64]	2.37***	[1.79, 3.15]
Victim only, ≥1/week	1.88***	[1.37, 2.57]	2.48***	[1.72, 3.59]
Perpetrator only, <1/week	0.92	[0.54, 1.57]	1.24	[0.76, 2.02]
Perpetrator only, ≥1/week	1.68	[0.82, 3.46]	0.91	[0.44, 1.90]
Victim-Perpetrator, <1/week	1.03	[0.66, 1.60]	1.77*	[1.10, 2.84]
Victim-Perpetrator, ≥1/week	1.59*	[1.05, 2.43]	2.40***	[1.47, 3.94]
FS^a				
Estimate (SE)	1.03***	[1.02, 1.05]	1.17***	[1.15, 1.90]
DERS Items^b				
Estimate (SE)	1.24***	[1.22, 1.27]	1.28***	[1.25, 1.31]
Model fit (c-statistic)	0.90		0.92	

Model I: Predicts the log-odds of GAD-10/anxiety score ≥10.

Model II: Predicts the log-odds of CESD-R-10/depression score ≥10.

Note. All models control for weekly spending money. Model I controls for CESD-R-10 and Model II controls for GAD-7. *Ref.* = reference category. AOR = adjusted odds ratio. CI = confidence interval. SE = standard error.

^a For the purposes of this study, the Flourishing Scale (FS) was changed to a 5-point Likert scale and was reverse-coded. Higher scores indicate poor overall wellbeing. Scores range from 8-40.

^b We used 6 items from the Difficulties in Emotional Regulation Scale (DERS), 1 from each of the 6 subscales. Scores range from 6-30.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

Discussion

In a large sample of Canadian high school students, we identified that clinically relevant symptoms of anxiety and depression were highly prevalent; more than one quarter of all students in our study reported clinically relevant symptoms of both anxiety and depression. Consistent with recent estimates of self-reported internalizing symptoms among Canadian female high school students (Boak et al. 2018), roughly half of the female students in our sample indicated clinically relevant anxiety and depression symptoms. Moreover, approximately 1 in 5 students in our sample reported involvement in school bullying as either victims, perpetrators, or victim-perpetrators; similar prevalence rates have been

documented elsewhere (Ottawa Public Health 2010). These results highlight a domain where there is considerable potential to intervene to promote the future health and wellbeing of youth.

We detected significant individual associations between bullying involvement and anxiety and depression symptoms, consistent with literature on mental health correlates and outcomes of bullying among adolescents. Our findings revealed similarities among victims and victim-perpetrators, who were generally 1.5 to 2.5 times more likely to report clinically relevant symptoms of anxiety and depression at almost all reported frequencies, compared to students who were uninvolved. As anticipated, students who were involved as perpetrators did not display symptoms of either affective disorder at any rate higher than the group of

Table 3 Standardized regression coefficient estimates and standard error of the α , β , and indirect ($\alpha\beta$) effects of anxiety (Y_1) and depression (Y_2) symptoms among bullying victims, perpetrators, and victim-perpetrators in the COMPASS MH-M Pilot Study (2016-2017), via flourishing (M_1) and emotional regulation (M_2)

Model ¹	Victims			Perpetrators		Victim-perpetrators	
	Effect	Estimate (SE)	95% CL	Estimate (SE)	95% CL	Estimate (SE)	95% CL
I	$X \rightarrow M_1$ (α)	2.85 (0.22)***	[2.43, 3.27]	0.81 (0.42)	[-0.02, 1.63]	3.99 (0.32)***	[3.36, 4.63]
	$M_1 \rightarrow Y_1$ (β)	0.08 (0.01)***	[0.07, 0.09]	0.08 (0.01)***	[0.07, 0.09]	0.08 (0.01)***	[0.07, 0.09]
	Indirect ($\alpha\beta$)	0.23 (0.03)***	[0.18, 0.28]	0.06 (0.03)	[-0.01, 0.13]	0.32 (0.04)***	[0.25, 0.39]
	Direct (c')	0.60 (0.09)***	[0.41, 0.78]	0.09 (0.20)	[-0.30, 0.49]	0.50 (0.14)***	[0.23, 0.78]
II	$X \rightarrow M_1$ (α)	2.85 (0.22)***	[2.43, 3.27]	0.81 (0.42)	[-0.02, 1.63]	3.99 (0.32)***	[3.36, 4.63]
	$M_1 \rightarrow Y_2$ (β)	0.21 (0.01)***	[0.19, 0.22]	0.21 (0.01)***	[0.19, 0.22]	0.21 (0.01)***	[0.19, 0.22]
	Indirect ($\alpha\beta$)	0.58 (0.05)***	[0.49, 0.68]	0.17 (0.09)	[-0.01, 0.33]	0.82 (0.07)***	[0.67, 0.96]
	Direct (c')	1.06 (0.10)***	[0.86, 1.25]	0.37 (0.18)*	[0.02, 0.73]	1.18 (0.14)***	[0.90, 1.46]
III	$X \rightarrow M_2$ (α)	3.02 (0.18)***	[2.66, 3.37]	1.03 (0.35)**	[0.33, 1.72]	3.15 (0.28)***	[2.61, 3.69]
	$M_2 \rightarrow Y_1$ (β)	0.23 (0.01)***	[0.21, 0.25]	0.23 (0.01)***	[0.21, 0.25]	0.23 (0.01)***	[0.21, 0.25]
	Indirect ($\alpha\beta$)	0.70 (0.05)***	[0.60, 0.80]	0.24 (0.08)**	[0.08, 0.40]	0.73 (0.07)	[0.59, 0.87]
	Direct (c')	0.60 (0.09)***	[0.41, 0.78]	0.09 (0.20)	[-0.30, 0.49]	0.50 (0.14)***	[0.23, 0.78]
IV	$X \rightarrow M_2$ (α)	3.02 (0.18)***	[2.66, 3.37]	1.03 (0.35)**	[0.33, 1.72]	3.15 (0.28)***	[2.61, 3.69]
	$M_2 \rightarrow Y_2$ (β)	0.30 (0.01)***	[0.27, 0.32]	0.30 (0.01)***	[0.27, 0.32]	0.30 (0.01)***	[0.27, 0.32]
	Indirect ($\alpha\beta$)	0.89 (0.06)**	[0.77, 1.01]	0.30 (0.11)**	[0.10, 0.51]	0.93 (0.09)***	[0.76, 1.10]
	Direct (c')	1.06 (0.10)***	[0.86, 1.25]	0.37 (0.18)*	[0.02, 0.73]	1.18 (0.14)***	[0.90, 1.46]

Model I: Tests the association between X and Y_1 via M_1 .

Model II: Tests the association between X and Y_2 via M_1 .

Model III: Tests the association between X and Y_1 via M_2 .

Model IV: Tests the association between X and Y_2 via M_2 .

Note. The uninvolved group was treated as the reference category for self-reported bullying involvement (X). All models control for grade, sex, ethnicity, and spending money. Models I and III control for CESD-R-10 and models II and IV control for GAD-7. Y_1 = GAD-7. Y_2 = CESD-R-10. M_1 = FS. M_2 = DERS Items. SE = standard estimate. CL = confidence limit.

¹ Refer to the simplified mediation model shown in Figure 1.

* $p < 0.05$

** $p < 0.01$

*** $p < 0.001$

uninvolved students. Existing research offers insight into this finding, as perpetrators may be more likely to experience symptoms of externalizing disorders (e.g. conduct disorder, oppositional-defiant disorder) rather than internalizing disorders (e.g. anxiety, depression) (Kim et al. 2018; Luukkonen et al. 2010). Given these findings, future research should seek to explore the relationships between bullying victimization, perpetration, and victim-perpetration (e.g. with the longitudinal waves of COMPASS MH-M data that will be available from 2017 to 2021) and with a wider variety of relevant mental disorders not collected in COMPASS.

Our analyses also examined overall mental wellbeing, or flourishing, and emotional regulation. As expected, flourishing and emotional regulation were associated with clinically significant symptoms of anxiety and depression among our sample of

Canadian high school students, regardless of bullying involvement. Along a flourishing-languishing continuum, students with poor overall wellbeing (languishing) experienced higher rates of anxiety and depression; likewise, students with trouble regulating their emotions were also more likely to report clinically relevant symptoms of anxiety and depression. On the other hand, positive mental wellbeing and healthy socio-emotional skills—each shown to be indicators of healthy psychosocial development and factors of resilience—have been found to help attenuate psychological sequelae of stressful life events and negative emotional experiences (Hinduja and Patchin 2017; O'Moore and Kirkham 2001). The results of our exploratory mediation analysis support these theories concerning the potential mechanisms by which bullying involvement is associated with increased risk of mental disorder; students who reported victimization showed

increased risk of anxiety and depression via languishing and emotional dysregulation. Students possessing good mental wellbeing, and an ability to cope well with life stressors, may recover more quickly from experiences of bullying victimization than students with poor mental wellbeing and difficulties controlling their emotions. Interestingly, previous evidence further suggests that students who engage in bullying as perpetrators often have poor emotional regulation skills (Cosma et al. 2014; Basharpour et al. 2013). Our results provide further support that among perpetrators, higher risk of anxiety and depression are mediated by greater emotional regulation difficulties. Interventions that serve to foster students' resiliency and emotional regulation skills may be well-suited to prevent mental disorders such as anxiety and depression and in turn, may act to reduce the burden of bullying. Being situated further upstream from traditional bullying prevention programs and campaigns, such interventions may also help address school bullying, as demonstrated elsewhere (Nathanson et al. 2016; Rivers et al. 2013); however, additional research in this area is required.

We also assessed the effect of several demographic characteristics among students on their self-reported GAD-7 and CESD-R-10 scores, while holding bullying involvement constant, and found grade and sex to be correlated with clinically relevant symptoms of anxiety and depression. In general, students in grades 10, 11, and 12 demonstrated higher likelihood of experiencing anxiety and depression compared to students in grade 9. A previous Canadian study has identified adolescents in later teen years as being more likely to experience psychological distress than younger students (Boak et al. 2016; Boak et al. 2018), reasons for which may be attributable to increased academic pressures; lower rates of daily physical activity; and increased screen time, which is shown to also increase students' exposure to cyberbullying (Drapeau et al. 2012; Sagatun 2010; Lissak 2018).

Sex differences were also observed among students in our study, where females were almost one and a half times as likely to report symptoms of depression, and nearly two and a half times more likely to report symptoms of anxiety, compared to their male counterparts. This resonates with known sex differences in experiences of mental disorder; female adolescents are more likely to experience internalizing disorders, while externalizing disorders (not captured in this study) are more common among males (Martel 2013). Interestingly, previous researchers have identified males as most likely to be perpetrators of bullying (Stubbs-Richardson et al. 2018; Stein et al. 2006). The correlates associated with mental disorder among our sample of Canadian high school students are seemingly interrelated and complex, extending beyond bullying involvement alone.

Limitations and Strengths

There are some limitations to our study. First, the cross-sectional nature of our analysis prevents us from inferring

whether symptoms of anxiety and depression precede or follow bullying involvement in youth. Likewise, the directionality between bullying behaviour, flourishing, and emotional regulation cannot be assumed. Existing longitudinal evidence supports our rationale for investigating bullying involvement as a risk factor for mental disorder (Kaltiala-Heino and Fröjd 2011), yet findings from other researchers such as Krygsman and Vaillancourt (2017) suggest that symptoms of depression may precede peer victimization. Future longitudinal analyses using additional waves of the COMPASS MH-M will be able to further examine the directionality of these interrelationships over time, and further investigate mechanistic pathways (including moderation) using more robust methods. Second, given the use of self-report measures, there may be some social desirability bias present on account of mental health stigma or perceived consequences for reporting bullying involvement; however, to encourage honest reporting, the COMPASS study uses active-information passive-consent protocols (White et al. 2004; Hollmann and McNamara 1999; Shaw et al. 2015; Gallagher et al. 2010) and does not require students to disclose any personal identifying information. Our study is also limited in its generalizability to all high school students for two main reasons: (1) we were only able to assess affective mental disorders such as anxiety and depression, and; (2) schools are not statistically representative of the entire Canadian population. Moreover, it is possible that schools who volunteered to participate in the MH-M pilot study differed from those who did not; as such, students from other COMPASS schools may have scored differently on the MH-M items. This can be assessed in the future using additional full-sample waves of COMPASS MH-M data. Next, the COMPASS questionnaire did not prompt student responses using a definition of bullying. Previous researchers have noted inconsistencies in how researchers and youth each define and report on bullying (Vaillancourt et al. 2008), and so the lack of definition should be noted as a limitation. Lastly, we were limited in our ability to discern between different types of bullying, such as physical, verbal, and cyber, as our MH-M pilot samples were not sufficiently sized. While general measurements of overall bullying behaviour may be useful for identifying involved versus non-involved youth, more specific measurements of bullying type (i.e. verbal, physical, cyber) are better able to discern bullying victims from perpetrators (Shaw et al. 2013). Future full-sample waves of the COMPASS MH-M will be able to further examine student differences by bullying type, beyond involvement.

Implications and Recommendations for Practice

Anti-bullying interventions at the school level may play a role in reducing the burden of anxiety and depression symptoms evident within high school populations, particularly among students who experience victimization. Demographic characteristics of students may be important for such policy and

program considerations; different age groups may require specifically targeted prevention programming, and programs should also be tailored differently towards females and males. However, with respect to bullying prevention programs and their ability to affect change in the area of youth mental health, interventions aimed at fostering resilience among students may be most successful and may even work to mitigate the risks of school bullying.

Evidence does not generally support the long-term efficacy of traditional anti-bullying efforts, such as zero-tolerance policies and awareness campaigns (Cantone et al. 2015). Overall rates of bullying in the twenty-first century may have decreased over time, albeit modestly, but more research is needed to identify factors that can further sustain this trend (Waasdorp et al. 2017). Future efforts should aim to systemically promote the overall psychosocial wellbeing and emotional intelligence of students. Such strategies be considered as primary prevention tools for targeting school-based bullying and subclinical mental disorders among Canadian high school students. The impact of these anti-bullying interventions could be examined as natural experiments using quasi-experimental methods in hierarchical longitudinal data systems such as COMPASS (Leatherdale 2019).

Beyond contributing to the literature, the findings of our study also have the potential to contribute to actionable high school bullying prevention practice. We recommend that practitioners and school administrators seek the adoption of upstream approaches to improve their students' overall psychosocial wellbeing and promote healthy socioemotional skills (e.g. emotional regulation). Such interventions may potentially prevent bullying involvement or help protect students against the impact of bullying on their mental health, and can be universal (i.e. entire school bodies) and/or targeted towards students identified as being involved in bullying. Specifically, programs and curricula that teach students: (1) how to recognize and manage their emotions in healthy ways, and (2) social skills (e.g. navigating relationships, empathy) may be better suited as upstream efforts to prevent bullying, especially as compared to traditional mental health or bullying awareness campaigns. These recommendations maintain that from a public health perspective, bullying prevention may additionally help to prevent the onset or escalation of anxiety and depression symptoms in high school students. From a clinical perspective, however, practitioners should also note the continued importance of identifying bullying-involved students, screening for symptoms of mental disorder, and assessing whether further intervention is needed.

Conclusion

Mental disorder and bullying involvement were both common among our large sample of Canadian youth. Significant

associations among several demographic and psychosocial characteristics, bullying involvement, and self-reported symptoms of anxiety and depression were observed; particularly with respect to victimization, grade, sex, flourishing, and emotional regulation. Our findings suggest that positive mental wellbeing and socio-emotional skills may be protective of mental disorder and existing evidence demonstrates that this may be true for bullying involvement. Given that a large portion of bullying takes place within a school environment, school-based prevention efforts that aim to foster emotional intelligence and improve flourishing among youth may be most effective at reducing the various psychosocial burdens associated with bullying.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Research Involving Humans and/or Animals All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This article does not contain any studies with animals performed by any of the authors.

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