



Evaluating factors associated with thoughts about self-harm in grade seven and ten students living in Canada



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Purpose: To examine if gender, friends, and certain activities are associated with self-harm thoughts in grade seven and ten students living in Canada.

Methods: A descriptive cross-sectional survey was completed by 8325 respondents. Odds ratios, p-values, and 95% confidence intervals were estimated using logistic regression analysis. Interaction terms and potential confounders were assessed.

Results: Significantly more youth engaged in self-harm behaviours in 2014/2015 compared to 2011/2012 (OR = 1.24; 95% CI = 1.05, 1.45). Having friends who smoke cigarettes (OR = 1.67; 95% CI = 1.32, 2.12), believing extracurricular activities are unimportant (OR = 1.37; 95% CI = 1.16, 1.62), frequently attending youth programs (OR = 1.30; 95% CI = 1.10, 1.53), and smoking cigarettes in the past year (OR = 2.45; 95% CI = 1.95, 3.09), all significantly increased odds of reporting self-harm thoughts. Having a lot of friends (OR = 0.54; 95% CI = 0.45, 0.65) and believing people like you (OR = 0.50; 95% CI = 0.42, 0.60) significantly decreased odds. A significant interaction between grade and consuming alcohol in the past year found that alcohol consumption increased the odds of reporting self-harm behaviours for students in both grades, with higher odds among grade seven alcohol drinkers compared to grade ten drinkers. An interaction between gender and having friends who use drugs found the effect of drug use among friends only significantly increased the odds of reporting thoughts about self-harm for females.

Conclusions: The results of this study can direct public health advocates and program developers towards creating tailored proactive interventions to meet the needs of youth residing within Canada.

1. Introduction

Mental health is one component of an individual's health and well-being (CHEO, 2010). As it has the potential to result in significant short- and long-term consequences, mental health should be acknowledged as a key factor in the development and maintenance of one's well-being, regardless of age (CHEO, 2010). For youth, their current mental health can have a strong impact on their future health, happiness, and success, which is why it is important to protect and manage this component of their lives both now and in the future (CHEO, 2010). Therefore, this paper will explore factors that are associated with poor youth mental health, focusing on thoughts about self-harm.

In 2011, a public health unit located in Canada was granted permission to implement a Youth Survey, which was used to collect data about youth who resided in the surrounding communities (WDG Report Card, 2015). This survey covers a variety of topics including physical, mental, and reproductive health, family, friends, relationships, youth

identity, school, community, and substance use. In the 2011/2012 school year, the public health unit collaborated with three local school boards to implement the Youth Survey for students in grades seven and ten (WDG Report Card, 2015). Three years later, the survey was again implemented in the 2014/2015 school year with slight modifications, including the addition of new questions and modifications to some of the original questions. Through this survey, the overall health and well-being of youth would be monitored, which could ultimately assist in the development of resources that could help these students to live healthy lives (WDG Report Card, 2015).

Self-harm refers to a collection of behaviours used to inflict intentional harm to one's body, without suicidal intent (Bakken & Gunter, 2012). Studies have found self-harm has become a common activity for many students in middle and high school, making it a major public health concern for this age group (Bakken & Gunter, 2012). An individual's overall likelihood of experiencing thoughts about self-harm can be the result of a combination of different factors (Wille, Bettge, &

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Ravens-Sieberer, 2008). Genetics, social connections, or one's lifestyle all have the potential to act as risk and/or protective factors for self-harm behaviours (Wille et al., 2008). However, adolescents who are exposed to more risk factors throughout their life will be more likely to experience thoughts about self-harm, compared to those who have solely one risk factor alone or multiple protective factors (Wille et al., 2008).

1.1. Gender

Adolescent men and women are both at risk for experiencing thoughts about self-harm (Mental Health Foundation, 2017). However, biological factors, such as their serotonin system and hormonal regulation often put females at a greater risk (ADAA, 2017; Mental Health Foundation, 2017; Rosch, 2014). Therefore, women are more likely to engage in self-harm behaviours compared to men (Bakken & Gunter, 2012; Rosch, 2014; Whitlock, 2010).

1.2. Social connections/friends

Spending time with friends allow youth to develop social skills, self-esteem, and support systems, which help young adults build a better perceived sense of well-being and overall health (Hartup, 1993; Kawachi & Berkman, 2001). Many of these developments are made through participating in programs or extracurricular activities, which have consistently been shown to be beneficial for the well-being of youth. Hartup (1993) However, if the friendships are unhealthy or if the friends participate in risky activities, a young adult may be at an increased risk for practicing self-harm behaviours (Berndt, 2004; Simons-Morton & Chen, 2006). Youth are easily influenced by their peers and may participate in activities solely to “fit in” with those around them, which can then have a direct impact on their overall health (Berndt, 2004). Furthermore, studies have found that self-harm can be “contagious”, as someone may begin to inflict intentional pain on themselves because they have witnessed someone do the same (Bakken & Gunter, 2012; Hawton, Saunders, & O'Connor, 2012; Whitlock, 2010). This is important to note for the adolescent population, as these individuals are easily influenced by the people who surround them (Bakken & Gunter, 2012).

1.3. Cigarette, alcohol, and cannabis use

A common predictor for substance use among adolescents is peer influences (Berndt, 2004). As a result, individuals with friends who smoke cigarettes, drink alcohol, and/or use cannabis, are typically at a higher risk of also participating in these activities (Berndt, 2004). Smoking cigarettes increases the likelihood of drug use, and has been linked to the development of participating in self-harm behaviours, regardless of age (Catchpole, McLeod, Brownlie, Allison, & Grewal, 2016; Chang, Sherritt, & Knight, 2005). Alcohol consumption can reduce the amount of time adolescents are able to engage in age-appropriate activities, which have historically helped to manage or improve their overall health (Huang, Ho, Wang, Lo, & Lam, 2016; Simons-Morton & Chen, 2006). In addition, the prevalence of violent behaviours and interpersonal conflicts are increased with increasing alcohol consumption, which can lead to self-harm behaviours (Huang et al., 2016). Adolescents who frequently use cannabis develop an increased risk for experiencing internalizing and externalizing problems, such as anxiety, depression, violence, and/or self-harm behaviours (van Gastel et al., 2013; van Gastel et al., 2014). In comparison to men, women typically fair worse after using these substances, as the chemicals found within them have a stronger effect on the female population, due to the biological makeup of the female body (van Gastel et al., 2014).

1.4. Research aim

The objective of this study is to investigate the association between gender, social connections, and substance use with the development of thoughts about self-harm in students in grades seven and ten. The information gathered from this study will assist public health advocates, schools, and the community in identifying youth who are at an increased risk for engaging in these behaviours, which can allow for the development of intervening programs.

2. Methods

2.1. Model building strategy

A cross-sectional survey was completed by 8325 students in grades seven and ten who resided within Canada. The variables selected from the survey for analysis had been shown in the literature to have impacted the likelihood of someone experiencing thoughts about self-harm. Furthermore, the selected variables did not differ between the 2011/2012 and 2014/2015 surveys, despite modifications to the later survey. A logistic regression model was fitted using StataSE v.14 (Stata Corp., College Station, Tx) to estimate the associations between the potential risk factors and the odds of having experienced thoughts about self-harm in the past year.

The original predictor variables included questions that required a response that was either dichotomous or measured on a Likert scale, with the range of the scale dependent on the specific question. However, the variables originally measured on these scales were dichotomized to allow for sufficient power for statistical analysis (Table 1). The outcome of experiencing thoughts about self-harm was also collapsed into a dichotomous response, based on the additive nature of this behaviour (Table 1) (Bakken & Gunter, 2012; Hawton, et al., 2012).

The initial eighteen predictor variables were included in univariable logistic regression models to examine their unconditional association with experiencing thoughts about self-harm (Table 2). Variables that did not have a significant association with the outcome ($\alpha = 0.05$) were not considered for inclusion in the multivariable model. A phi coefficient was used to determine if there was potential collinearity among predictor variables. If the correlation was $> |0.8|$, the variable that was most significant or biologically plausible was used in the subsequent multivariable model.

The initial main effects model was constructed using manual backwards elimination using a Wald's X^2 ($\alpha = 0.05$) to test the significance of each variable. Variables were included in the final multivariable model if they were statistically significant, a confounding variable, or were part of a statistically significant interaction term. Year was forced into the model due to interest in addressing whether the prevalence of thoughts concerning self-harm had changed over time.

2.2. Confounding variables

Confounding variables were non-intervening variables whose removal from the model resulted in a 20% or greater change in the coefficient of another variable in the model (Dohoo, Martin, & Stryhn, 2012). The hypothesized causal relationships among variables were identified using a causal diagram (Fig. 1).

2.3. Interactions

“Gender” and “Grade” were both tested as two-way interactions with “I have friends who smoke cigarettes”, “I have friends who use drugs”, “I have smoked cigarettes in the past year”, and “I have consumed alcohol in the past year”. “I have friends who smoke cigarettes” was tested as a two-way interaction with “I have friends who use drugs”. Lastly, “I have smoked cigarettes in the past year” was tested as

Table 1

Descriptive statistics concerning the responses of grade seven and ten students to the Youth Survey (2011/2012 & 2014/2015) concerning independent variables examined for their association with thoughts about self-harm.

Survey Question	Dichotomized categorical response (Original survey response options)			
	Yes (Always, Sometimes, Often)		No (Rarely, Never)	
In the past 12 months, have you thought about harming yourself?	15.4% (1178/7632)		84.5% (6454/7632)	
Year of survey	2011/2012		2014/2015	
What grade are you in?	Grade Seven		Grade Ten	
Are you male or female?	Male		Female	
Where do you live?	Region A	Region B	Region C	Region D
Do you have many friends?	22.2% (1849/8302)	27.8% (2305/8302)	49.1% (4074/8302)	0.9% (74/8302)
Do you get along easily with others your age?	79.8% (6453/8082)	20.2% (1629/8082)	False (False, Mostly False, Sometimes True/Sometimes False)	
Do others your age want to be your friend?	78.1% (6275/8044)	21.9% (1769/8044)	False (False, Mostly False, Sometimes True/Sometimes False)	
Do people like you?	57.8% (4624/7998)	42.2% (3374/7998)	False (False, Mostly False, Sometimes True/Sometimes False)	
How important is it for you to make friends?	68.6% (5483/7991)	31.4% (2508/7991)	Not Important (Not Very Important, Not At All Important)	
How important is it for you to participate in extracurricular activities?	91.6% (7446/8126)	8.36% (680/8126)	Not Important (Not Very Important, Not At All Important)	
How often have you attended youth programs in the past 12 months?	73.1% (5912/8091)	26.9% (2179/8091)	Never (Once A Month, Less Than Once A Month, Never)	
Do you have friends who smoke cigarettes?	33.8% (2698/7987)	66.2% (5289/7987)	No (None)	
Do you have friends who use drugs?	21.6% (1638/7566)	78.4% (5928/7566)	No (None)	
Have you smoked a cigarette in the past 12 months?	26.9% (2018/7512)	73.1% (5494/7512)	No	
How often do you currently smoke cigarettes?	10.4% (801/7684)	89.6% (6883/7684)	Never	
Have you consumed alcohol in the past 12 months?	Every Day	Sometimes (At Least Once A Week, Less Than Once A Week)	94.8% (7272/7668)	
Have you participated in binge drinking in the past 12 months?	2.5% (188/7668)	2.7% (208/7668)	No	
Have you used cannabis in the past 12 months?	Yes	61.5% (4574/7443)	38.5% (2869/7443)	
	Yes (More Than Once A Week, Once A Week, 2-3 Times A Month, Once A Month, Less Than Once A Month)	22.2% (1700/7645)	No (No)	
	Yes (Yes)	77.8% (5945/7645)	No (I Have Never Used It, I Have Used It But Not In The Last 12 Months)	
	13.7% (1048/7632)	86.3% (6584/7632)		

an interaction with “I have consumed alcohol in the past year”. These interactions were initially examined with their main effects, and if significant, were then examined in the multivariable model.

2.4. Goodness-of-fit test, influential observations, and diagnostics

The Hosmer–Lemeshow Goodness-of-fit test was conducted to assess the overall fit of the model. The following diagnostics were performed to identify potential outliers and influential observations/covariate patterns: Pearson residuals, standardized residuals, deviance residuals, leverage, covariate numbers, Delta X², Delta-deviance, and Delta-beta. Potential outliers and highly influential observations/covariate patterns were removed from the model to determine their influence on the interpretation of the final model.

3. Results

3.1. Descriptive statistics

Of the participants who completed the Youth Survey in 2011/2012

or 2014/2015, 91.6% of the students (7632/8325) responded to the question asking whether they had experienced thoughts about self-harm in the past year (Table 1). Of these respondents, 15.4% (1178/7632) indicated that they had considered self-harming (Table 1). The participants of this study provided an almost equal representation for both grade and gender (Table 1). Furthermore, most respondents prioritized having friends, participating in extracurricular activities and getting along with others their age, while refraining from substance use (Table 1).

3.2. Included variables

Seventeen of the original predictor variables were considered for inclusion in the multivariable model based on the univariable analysis (Table 2). The following variables were included in the final multivariable model based on the statistical significance of their main effects: year, gender, I have friends who smoke cigarettes, I have friends who use drugs, the frequency of participating in youth programs, the importance of extracurricular activities, I have a lot of friends, people like me, I have smoked cigarettes in the past year, and I have consumed

Table 2

Univariable analysis examining the unconditional association between each of the original 18 predictor variables and the outcome of experiencing thoughts about self-harm based on grade seven and ten student responses to the Youth Survey (2011/2012 & 2014/2015).

Variable name		Odds ratio	95% Confidence Interval	P-Value
Year	2011/2012	Referent		
	2014/2015	1.09	0.96, 1.24	0.175
Grade	10	Referent		
	7	0.61	0.54, 0.69	<0.0001
Gender	Female	Referent		
	Male	0.46	0.40, 0.52	<0.0001
Geography	Region A	Referent		
	Region B	0.97	0.83, 1.14	0.729
	Region C	1.08	0.90, 1.28	0.415
	Region D	1.21	0.64, 2.29	0.560
Friends smoke cigarettes	No	Referent		
	Yes	3.29	2.87, 3.77	<0.0001
Friends use drugs	No	Referent		
	Yes	3.00	2.63, 3.43	<0.0001
Frequency of youth program	Never	Referent		
	Often	1.25	1.09, 1.42	0.001
Importance of extracurricular activities	Important	Referent		
	Not Important	1.97	1.72, 2.24	<0.0001
The importance of making friends	Important	Referent		
	Not Important	2.52	2.10, 3.03	<0.0001
I have many friends	False	Referent		
	True	0.30	0.29, 0.38	<0.0001
I get along easily with others my age	False	Referent		
	True	0.36	0.31, 0.41	<0.0001
Others my age want to be my friend	False	Referent		
	True	0.46	0.40, 0.52	<0.0001
People like me	False	Referent		
	True	0.35	0.31, 0.40	<0.0001
I smoked cigarettes in the past year	No	Referent		
	Yes	4.61	3.93, 5.42	<0.0001
Smoking frequency	Every day	Referent		
	I do not smoke	0.15	0.11, 0.20	<0.0001
	Sometimes	0.70	0.47, 1.05	0.082
I drank alcohol in the past year	No	Referent		
	Yes	2.67	2.34, 3.03	<0.0001
I participated in binge drinking in the past year	No	Referent		
	Yes	2.73	2.39, 3.12	<0.0001
I used cannabis in the past year	No	Referent		
	Yes	3.41	2.93, 3.96	<0.0001

alcohol in the past year. After testing for confounding variables, grade was brought back into the model. Testing for significant interactions resulted in the inclusion of two interaction terms: “Grade” with “I consumed alcohol in the past year” (p -value = 0.0017) and “Gender” with “I have friends who use drugs” (p -value = < 0.0001) (Table 3).

3.3. Final model interpretation

Students who responded to the survey in 2014/2015 had significantly greater odds of reporting thoughts about self-harm than those in 2011/2012 (OR = 1.24; 95% CI = 1.05, 1.45) (Table 3). Having friends who smoke cigarettes (OR = 1.67; 95% CI = 1.32, 2.12), having smoked in the past year (OR = 2.45; 95% CI = 1.95, 3.09), frequently participating in youth programs (OR = 1.30; 95% CI = 1.10, 1.53) and believing that extracurricular activities are not important (OR = 1.37; 95% CI = 1.16, 1.62) were found to significantly increase the odds of someone reporting thoughts about self-harm (Table 3). Meanwhile, having many friends (OR = 0.54; 95% CI = 0.45, 0.65), and believing that people like you (OR = 0.50; 95% CI = 0.42, 0.60) significantly reduced the odds of reporting thoughts about self-harm (Table 3).

Grade seven students who had consumed alcohol in the past year were at significantly greater odds of reporting thoughts about self-harm in the past year compared to grade ten (OR = 2.61; 95% CI = 1.94, 3.51) or seven students (OR = 2.40; 95% CI = 1.85, 3.10) who had not consumed alcohol, or grade ten students who had consumed alcohol (OR = 1.89; 95% CI = 1.46, 2.46) (Table 4). Grade ten students who

had consumed alcohol in the past year were at significantly greater odds of reporting thoughts about self-harm in the past year compared to grade seven (OR = 1.27; 95% CI = 1.01, 1.59) or grade ten (OR = 1.38; 95% CI = 1.07, 1.79) students who had not consumed alcohol (Table 4). A significant difference was not found between grade seven and ten students who had not consumed alcohol in the past year (Table 4).

Females with friends who used drugs had significantly greater odds of reporting thoughts about self-harm in the past year compared to males with friends who used (OR = 4.00; 95% CI = 3.11, 5.15) or did not use drugs (OR = 4.29; 95% CI = 3.22, 5.72), or females with friends who did not use drugs (OR = 2.27; 95% CI = 1.73, 2.97) (Table 5). Females with friends who did not use drugs had significantly greater odds of reporting thoughts about self-harm compared to males who had friends who used (OR = 1.77; 95% CI = 1.31, 2.38) or did not use (OR = 1.89; 95% CI = 1.54, 2.32) drugs (Table 5). No significant difference was found between males with friends who used drugs and males with friends who did not use drugs (Table 5).

3.4. Final model diagnostics

Based on the Hosmer–Lemeshow Goodness-of-fit test, we did not reject the null hypothesis that the model fit the data ($X^2 = 6.50$; Degrees of Freedom = 8; p -value = 0.591). Based on diagnostics performed for individual covariate patterns, there was no indication that the removal of any individual covariate pattern that was identified as a

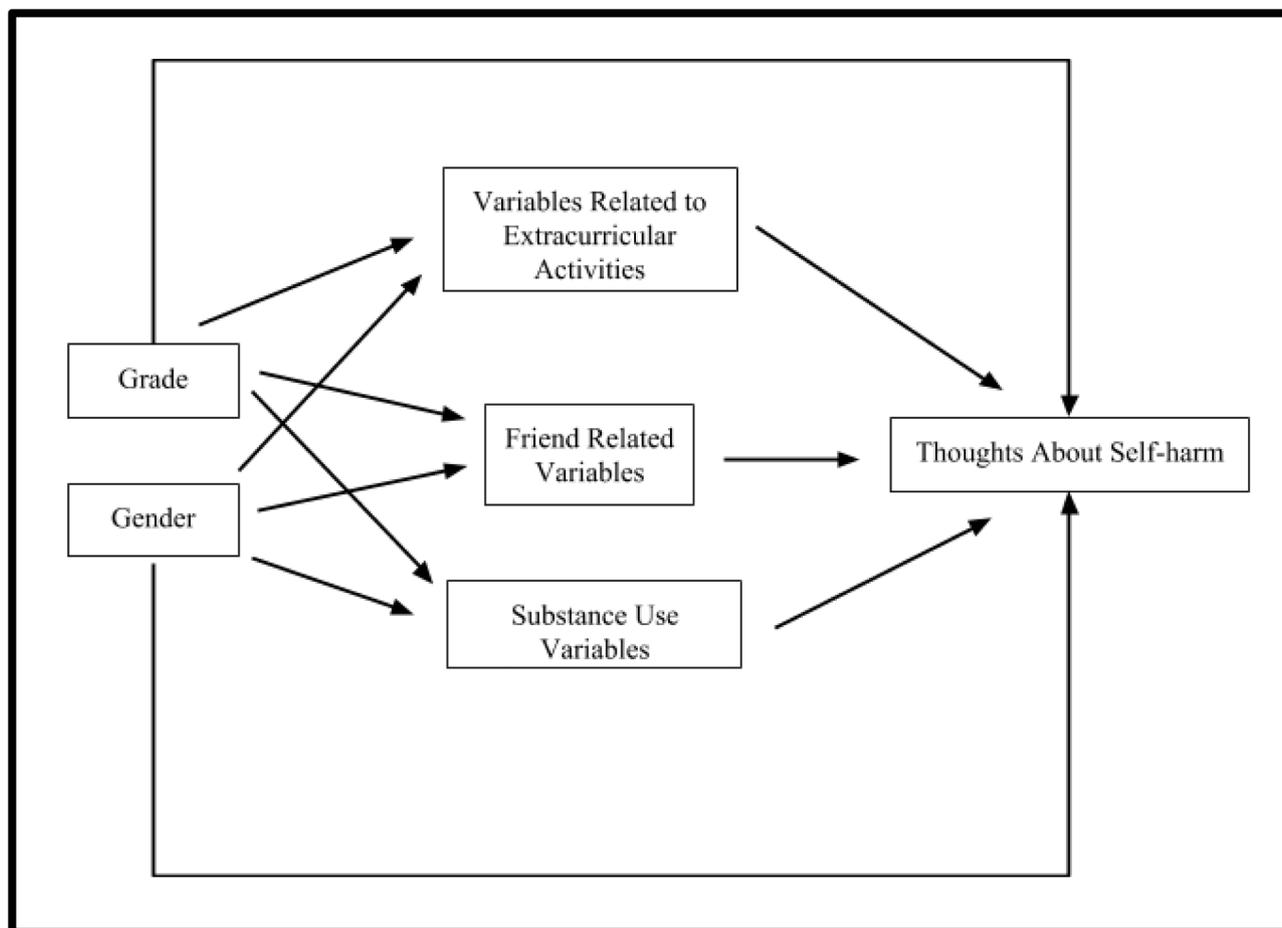


Fig. 1. A simplified causal diagram describing the hypothesized relationships between the predictor variables and the dependent variable, thoughts about self-harm. This diagram does not include any potential interaction effects.

potential outlier or being highly influential altered the interpretation of our final model.

4. Discussion

Many different factors can influence the overall health and well-being of adolescents (Wille et al., 2008). This study shows an association between a collection of potential risk factors with an outcome of experiencing thoughts about self-harm, with many of these risk factors having been previously supported in other studies.

More students are reporting thoughts about self-harm in the 2014/2015 school year, compared to in 2011/2012. This could be the result of a variety of reasons, such as some of the participants have changed, time has passed, or the participants may be exposed to different experiences and influential factors, compared to when the first survey was conducted. However, as the odds of self-harm among adolescents have increased, it is important to recognize this change and to act to make a difference. These results are consistent with previous literature (Bakken & Gunter, 2012).

Differential gender effects were noted in our study with the effect of peer drug use only being found in female students. Regardless of whether a female has friends who used drugs, females were at greater odds of reporting thoughts about self-harm, compared to their male counterparts who either used or did not use drugs. In addition, females with friends who used drugs were at greater odds of reporting thoughts about self-harm compared to females with friends who did not use drugs. These results are consistent with other studies where individual drug use or peer drug use was found to produce a stronger negative effect in the female population compared to males (Bakken & Gunter,

2012; van Gastel et al., 2014). As a result, it is important to recognize this difference between males and females, and to ensure that the needs of both genders are met.

As found in this study, cigarette use, both by peers or individual use, significantly impacts the likelihood of someone engaging in self-harm activities. The results of this study indicate that spending time with others who smoke cigarettes will often increase the likelihood of someone reporting thoughts about self-harm, demonstrating an at-risk group within the population. This is not surprising, as substance use has consistently demonstrated to negatively impact health and well-being (Catchpole et al., 2016; Chang et al., 2005). Furthermore, adolescents are strongly influenced by their peers, so if many of their friends are engaging in risky activities, the likelihood of a member of the friend group doing the same is increased, thus leading to individual substance use (Berndt, 2004; Simons-Morton & Chen, 2006). Adolescence is an important time for shaping an individual's identity; therefore, many young adults will participate in activities to fit in with or feel more accepted in a group, regardless of the harmfulness of the activity (Berndt, 2004). From a public health perspective, it is difficult to control the social environment that youth select for themselves, as adolescents are the primary decision makers for who they spend time with and befriend (Hartup, 1993). However, parents, teachers, and caregivers should be educated about the consequences of cigarette use and be able to recognize if their child(ren)/student(s) are involved with a risky group of peers. Although some initiatives are present in the school boards to help prevent students from smoking cigarettes, the results of this study indicate students remain active with this activity, despite the precautions and negative outcomes. As a result, it is important for further research to be conducted to determine an appropriate program

Table 3

The results of the final multivariable model concerning grade seven and ten student responses to the Youth Survey (2011/2012 & 2014/2015) to questions concerning relationships, substance use, and attitudes and the odds of experiencing thoughts about self-harm in the past twelve months.

Variable Name	Category	Odds Ratio	95% Confidence Interval	P-Value
Year	2011	Referent		
	2014	1.24	1.05, 1.45	0.009
Grade⁺	Grade Ten	Referent		
	Grade Seven	1.09	0.85, 1.40	0.494
Gender⁺⁺	Female	Referent		
	Male	0.53	0.43, 0.65	<0.0001
Friends smoke cigarettes	No	Referent		
	Yes	1.67	1.32, 2.12	<0.0001
Friends use drugs⁺⁺	No	Referent		
	Yes	2.27	1.73, 2.97	<0.0001
Frequency of youth program	Never	Referent		
	Often	1.30	1.10, 1.53	0.002
Importance of extracurricular activities	Important	Referent		
	Not important	1.37	1.16, 1.62	<0.0001
I have many friends	False	Referent		
	True	0.54	0.45, 0.65	<0.0001
People like me	False	Referent		
	True	0.50	0.42, 0.60	<0.0001
I smoked cigarettes in the past year	No	Referent		
	Yes	2.45	1.95, 3.09	<0.0001
I drank alcohol in the past year⁺	No	Referent		
	Yes	1.38	1.07, 1.78	0.002
Grade*I drank alcohol in the past year⁺	Grade	1.74	1.23, 2.45	0.002
	7*Alcohol			
Gender*Friends use drugs⁺⁺	Male*Drugs	0.47	0.34, 0.65	<0.0001

⁺ See Table 4 for interpretation of interaction effects.

⁺⁺ See Table 5 for interpretation of interaction effects.

^{+, +, ++}Note: All main effects and their interaction terms are exponentiated coefficients, not true odds ratios.

that would meet the needs and interests of this population.

A significant interaction between individual alcohol use and a student's grade can influence the odds of reporting thoughts about self-harm. Regardless of grade, students who have consumed alcohol in the past year had greater odds of reporting thoughts about self-harm, compared to students who did not consume alcohol. However, students in grade seven who had consumed alcohol had significantly greater odds of reporting thoughts about self-harm compared to students in grade ten who also consumed alcohol. This is consistent with previous literature, as alcohol consumption is more impactful on those who are younger and will continue to impact them through a dose-response relationship if they continue to drink (Huang et al., 2016). The earlier an individual begins to consume alcohol, the more complications they will experience (Huang et al., 2016). Meanwhile, refraining from alcohol use has previously shown to protect one's likelihood of practicing self-harm activities (Simons-Morton & Chen, 2006). It is therefore essential for resources and programs to be developed that would meet the needs of these populations and help to reduce the number of students who consume alcohol. It is important to note that the survey did not ask specifically when the respondent began consuming alcohol, which could have the potential to influence these results.

Friends can act as both risk and/or protective factors for engaging in

self-harm behaviours (Berndt, 2004; Hartup, 1993). They can provide adolescents with support and the opportunity to have fun, both of which are factors that have previously shown to help reduce the likelihood of someone reporting self-harm behaviours (Hartup, 1993). The results of this study suggest that having many friends and believing that people like you work as protective factors for reporting thoughts about self-harm, as they decrease the likelihood of someone engaging in these behaviours. This is consistent with previous research and is likely primarily due to the positive support and companionship that friends can provide (Hartup, 1993). However, those who do not have many friends or who believe that people do not like them, are at a higher risk of reporting thoughts about self-harm. It is important for parents, caregivers, and educators to be able to recognize when students appear to be lonely or without friends, and to provide them with the support they need. In addition, promoting activities that allow youth to engage with each other and to develop friendships will likely help to improve their overall health and well-being (Hartup, 1993). Friendships built on a positive foundation have been consistently proven to be beneficial for people of all ages, especially adolescents (Hartup, 1993).

Participating in youth programs and extracurricular activities allows youth to have fun, be social, and learn new skills (Huang et al., 2016; Simons-Morton & Chen, 2006). These factors have all previously

Table 4

A table of contrasts examining the two-way interaction between the variables “Grade” and “I have consumed alcohol in the past year” with the odds of experiencing thoughts about self-harm in the past twelve months for the final multivariable model.

Contrasts	Odds Ratio	95% Confidence Interval	P-Value
Grade 7 alcohol vs. grade 10 no alcohol	2.61	1.94, 3.51	<0.0001
Grade 10 alcohol vs. grade 7 no alcohol	1.27	1.01, 1.59	0.045
Grade 10 alcohol vs. grade 10 no alcohol	1.38	1.07, 1.79	0.013
Grade 7 alcohol vs. grade 7 no alcohol	2.40	1.85, 3.10	<0.0001
Grade 7 alcohol vs. grade 10 alcohol	1.89	1.46, 2.46	<0.0001
Grade 7 no alcohol vs. grade 10 no alcohol	1.09	0.85, 1.40	0.494

Note: The key estimates presented are true odds ratios.

Table 5

A table of contrasts examining the two-way interaction between the variables “Gender” and “I have friends who use drugs” with the odds of experiencing thoughts about self-harm in the past twelve months for the final multivariable model.

Contrasts	Odds ratio	95% Confidence interval	P-Value
Female drugs vs. male no drugs	4.29	3.22, 5.72	<0.0001
Female no drugs vs. male drugs	1.77	1.31, 2.38	<0.0001
Male drugs vs. male no drugs	1.07	0.78, 1.47	0.662
Female drugs vs. female no drugs	2.27	1.73, 2.97	<0.0001
Female drugs vs. male drugs	4.00	3.11, 5.15	<0.0001
Female no drugs vs. male no drugs	1.89	1.54, 2.32	<0.0001

Note: The key estimates presented are true odds ratios.

been shown to act as protective factors against self-harm (Huang et al., 2016; Simons-Morton & Chen, 2006). As a result, these activities should be available for all students, which is an important public health initiative. However, the results of this study provide contradicting information. Those who viewed extracurricular activities as being important were less likely to report thoughts about self-harm, but those who frequently participated in youth programs were more likely to report these thoughts. This result ultimately warrants more research, as similar results regarding youth programs have not been found before in previous studies. A possible reason for this finding is due to the contagious nature of self-harm. If other youth that are attending these programs are practicing self-harm, then other participants may see this and ultimately begin to also injure themselves (Bakken & Gunter, 2012). A further point to consider is the dynamics of the students who participate in extracurricular activities. Further research should consider investigating whether students who participate in extracurriculars are more willing to report self-harm behaviours. If a significant trend is found here, this could be an important consideration in the interpretation of these types of studies.

Overall, the results of this study make it apparent there are many risk and protective factors that can influence the likelihood of someone engaging in self-harm behaviours. It is important for resources and programs that address these influential factors to be readily available to youth of all ages, so that this population can be provided with support and information about the importance of protecting their well-being. This would include the development of resources that recognize gender differences, while simultaneously educating youth about the importance of healthy friendships, getting involved, and refraining from risky behaviours. Through this, the hope would be that students would be less likely to engage in self-harm behaviours.

5. Limitations

The information collected within the Youth Survey is self-reported, which can create a misclassification bias, as the participants may not fully understand the questions, or they may feel pressured to provide answers that would be considered socially acceptable. As a result, false negatives and/or false positives may be present in their responses. A second limitation was that the predictor variables were categorical, with many of them providing ordinal results, as survey data were used. As a result, many dummy variables had the potential to be present within the final model. To obtain enough power and to meet the assumptions of the model, many of the categories were required to be collapsed into a dichotomous result, limiting the amount of detail we could obtain from these results.

6. Conclusion

The results of this study provide a direct focus on the relationship between gender, social connections, extracurricular activities, and substance use as potential influential factors for experiencing thoughts about self-harm for students in grades seven and ten. The results from this study will be important in understanding the lifestyles and

development of youth who reside within Canada. This study will provide local service agencies, along with parents, educators, school boards, and public health advocates with a deeper understanding of the health, lifestyle, and overall development of students residing in these areas. These findings can help inform program developers about potential high-risk groups, which can allow for targeted programs to be developed. As a result, the findings from this study can be used to help develop, structure, and improve community and education programs, services, and resources, which will help to ensure that youth are protected and able to live happier and healthier lives.

Declaration of interest

none.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.mhp.2018.12.004](https://doi.org/10.1016/j.mhp.2018.12.004).

References

- Anxiety and Depression Association of America (ADAA). (2017). Live and thrive women: Facts. Retrieved 2 May 2017 from <http://www.adaa.org/living-with-anxiety/women/facts>.
- Bakken, N. W., & Gunter, W. D. (2012). Self-cutting and suicidal ideation among adolescents: Gender differences in the causes and correlates of self-injury. *Deviant Behaviour*, 33, 339–356. <https://doi.org/10.1080/01639625.2011.584054>.
- Berndt, T. J. (2004). Children's friendships: Shifts over a half-century in perspectives on their development and their effects. *Merrill-Palmer Quarterly*, 50(3), 206–223.
- Catchpole, R. E. H., McLeod, S. L., Brownlie, E. B., Allison, C. J., & Grewal, A. (2016). Cigarette smoking in youths with mental health and substance use problems: Prevalence, patterns, and potential for intervention. *Journal of Child & Adolescent Substance Abuse*, 26(1), 41–55. <https://doi.org/10.1080/1067828X.2016.1184600>.
- Chang, G., Sherritt, L., & Knight, J. R. (2005). Adolescent cigarette smoking and mental health symptoms. *Journal of Adolescent Health*, 36(6), 517–522. <https://doi.org/10.1016/j.jadohealth.2004.05.008>.
- Children's Hospital of Eastern Ontario (CHEO). (2010). *Mental health and mental illness in children and youth: Fact sheet for parents and caregivers*. Ottawa, Ontario. Retrieved 22 April 2017 from http://www.cheo.on.ca/uploads/13389_Mental_Health_and_Illness_Overview.pdf.
- Dohoo, I., Martin, W., & Stryhn, H. (2012). *Methods in epidemiologic research*. Charlottetown, PEI: VER Inc319.
- Hartup, W. W. (1993). Adolescents and their friends. *New Directions for Childhood Development*, 60, 3–22.
- Hawton, K., Saunders, K. E. A., & O'Connor, R. C. (2012). Suicide 1: Self-harm and suicide in adolescents. *The Lancet*, 379, 2373–2382. [https://doi.org/10.1016/S0140-6736\(12\)60322-5](https://doi.org/10.1016/S0140-6736(12)60322-5).
- Huang, R., Ho, S. Y., Wang, M. P., Lo, W. S., & Lam, T. H. (2016). Reported alcohol

- drinking and mental health problems in Hong Kong Chinese adolescents. *Drug and Alcohol Dependence*, 164, 47–54. <https://doi.org/10.1016/j.drugalcdep.2016.04.028>.
- Kawachi, I., & Berkman, L. F. (2001). Social ties and mental health. *Journal of Urban Health*, 78(3), 458–467.
- Mental Health Foundation. (2017). *Women and mental health*. Mental Health Foundation. Retrieved 2 May 2017, from <http://www.mentalhealth.org.uk/a-to-z/w/women-and-mental-health>.
- Rosch, P. (2014). *Why do women suffer more from depression and stress?* The American Institute of Stress. Retrieved 2 May 2017, from <http://www.stress.org/why-do-women-suffer-more-from-depression-and-stress/>.
- Simons-Morton, B., & Chen, R. S. (2006). Over time relationships between early adolescent and peer substance use. *Addictive Behaviours*, 31, 1211–1223. <https://doi.org/10.1016/j.addbeh.2005.09.006>.
- van Gastel, W. A., Tempelaar, W., Bun, C., Schubart, C. D., Kahn, R. S., Plevier, C., & Boks, M. P. (2013). Cannabis use as an indicator of risk for mental health problems in adolescents: A population-based study at secondary schools. *Psychological Medicine*, 43(9), 1849–1856. <https://doi.org/10.1017/S0033291712002723>.
- van Gastel, W. A., MacCabe, J. H., Schubart, C. D., van Otterdijk, E., Kahn, R. S., & Boks, M. P. (2014). Cannabis use is a better indicator of poor mental health in women than in men: A cross-sectional study in young adults from the general population. *Community Mental Health*, 50(7), 823–830. <https://doi.org/10.1007/s10597-014-9699-6>.
- WDG Report Card (Wellington-Dufferin-Guelph Report Card). (2015). Wellington-Dufferin-Guelph Youth Survey. *WDG Report Card*. Retrieved 20 April 2017 from <http://www.wdgreportcard.com/#/wdg-youth-survey/4555917274>.
- Whitlock, J. (2010). *What is self-injury?*. [Fact sheet] Cornell research program on self-injurious behavior in adolescents and young adults. Retrieved 28 May 2017, from http://www.selfinjury.bctr.cornell.edu/factsheet_aboutsi.asp.
- Wille, N., Bettge, S., & Ravens-Sieberer, U. the Bella Study Group. (2008). Risk and protective factors for children's and adolescents' mental health: Results of the BELLA study. *European Child & Adolescent Psychiatry*, 147(1), 133–147. <https://doi.org/10.1007/s00787-008-1015-y>.