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Original Research

Associations of School Connectedness With Adolescent Suicidality: Gender Differences and the Role of Risk of Depression

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Objective: Previous studies have not examined associations of school connectedness with adolescent suicidal behaviours stratified by gender, while including a measure of depression. We analyzed survey data to determine whether there are independent protective associations of higher school connectedness with suicidal behaviours in Canadian adolescents, while controlling for potential confounders, including risk of depression; and whether such associations differ by gender.

Method: Using data from a stratified cluster sample of randomly selected classes of students in schools in 3 of Canada's Atlantic provinces, we used multiple logistic regression to examine whether associations of risk of depression, measured using the 12-item Center for Epidemiologic Studies–Depression scale, lessened protective associations of higher school connectedness with suicidal behaviours in grades 10 and 12 students, while stratifying by gender.

Results: After adjusting for risk of depression, higher school connectedness was independently associated with decreased suicidal ideation in both genders and with suicidal attempt in females. In males, higher connectedness was no longer protective for suicide attempt when risk of depression was included in the model.

Conclusions: School connectedness, which is felt to have positive influences on many types of adolescent behaviour, appears to also be both directly and indirectly protective for suicidality. These effects may occur through different pathways in females and males. Given the protection it offers both genders, including those at risk and not at risk of depression, increasing school connectedness should be considered as a universal adolescent mental health strategy. Studies that examine school connectedness should include analyses that examine potential differences between males and females.

Associations du sentiment d'appartenance à l'école avec la suicidaité des adolescents : les différences selon le sexe et le rôle du risque de dépression

Objectif : Les études antérieures n'ont pas examiné les associations du sentiment d'appartenance à l'école avec les comportements suicidaires des adolescents stratifiés selon le sexe, tout en incluant une mesure de la dépression. Nous avons analysé les données des enquêtes pour déterminer s'il y a des associations indépendantes protectrices d'un plus grand sentiment d'appartenance à l'école avec les comportements suicidaires des adolescents canadiens, tout en contrôlant les facteurs confusionnels potentiels, dont le risque de dépression; et si ces associations diffèrent selon le sexe.

Méthode : En nous servant des données d'un échantillon en grappes stratifié d'élèves de classes sélectionnées au hasard dans des écoles de 3 provinces atlantiques du Canada, nous avons utilisé la régression logistique multiple pour examiner si les associations avec le risque de dépression, mesuré par l'échelle de dépression en 12 items du centre d'études épidémiologiques, amoindrissaient les associations protectrices d'un plus grand sentiment d'appartenance à l'école avec les comportements suicidaires des élèves de 10e et de 12e année, tout en stratifiant selon le sexe.

Résultats : Après correction pour le risque de dépression, le plus grand sentiment d'appartenance à l'école était indépendamment associé avec une idéation suicidaire réduite chez les deux sexes, et avec les tentatives de suicide chez les filles. Chez les garçons, le plus grand sentiment d'appartenance à l'école ne protégeait plus contre les tentatives de suicide quand le risque de dépression était inclus dans le modèle.

Conclusions : Le sentiment d'appartenance à l'école, que l'on croit avoir des influences positives sur de nombreux types de comportement d'adolescents, semble être aussi directement et indirectement protecteur contre la suicidalité. Ces effets peuvent se manifester par différentes trajectoires chez les filles et les garçons. Étant donné la protection qu'il procure aux deux sexes, dont ceux à risque et non à risque de dépression, un plus grand sentiment d'appartenance à l'école devrait être considéré comme une stratégie universelle pour la santé mentale des adolescents. Les études qui examinent le sentiment d'appartenance à l'école devraient inclure des analyses qui étudient les différences potentielles entre filles et garçons.

Adolescence often involves isolation and stress as young people transition through what can be a difficult period of development and identity formation.[1] This period can be associated with suicidality in adolescents—in 2009 suicide was the second leading cause of death among Canadians of both genders aged 15 to 24 years,[2] and in the United States, 10% of high school students report having attempted suicide.[3] Many factors have been associated with adolescent suicidality, including substance use,[4] poor academic performance,[5] depression,[4,6,7] family violence,[4] minority sexual orientation,[8,9] low SES,[10] having had a close friend or family member attempt suicide,[4] and lower levels of religiosity.[11,12]

School connectedness, which also has been examined in association with adolescent suicidality, relates to how students perceive they are supported, respected, and involved in the school environment.[13] The strong correlations between school connectedness and positive youth development in various areas, including health, education, and psychology, have been known for some time,[14] and the potential for school connectedness to affect these outcomes positively is felt to be large.[15] Students with less connection to school have been shown to have poorer self-rated health,[16] poorer psychological status,[17] and a lower likelihood of completing school.[18] They are also more likely to engage in violence,[19] substance use,[20,21] smoking,[22] and risky sexual behaviours.[23,24]

In theorizing how school connectedness is created and affects youth health behaviours, Catalano and Hawkins[25] propose that school connectedness results from students' attachment and commitment to school and their involvement in it. Their Social Development Model[25] hypothesizes that children learn patterns of behaviour from their social environments, and that this learning occurs in 4 ways: their perceptions of opportunities for being involved with others; their ability to interact with others; their actual involvement; and, the rewards they perceive as emanating from such involvement. Social bonding develops between the individual child, others in the school, and the activities that take place at school through these mechanisms, and such bonding is felt to dissuade behaviours that disrupt the school environment. This is felt to occur because, with such bonding, the individual has more need to conform to the school's values and norms, so as not to risk losing these ties. Such reasoning is compatible with the Interpersonal Theory of Suicide put forward initially by Joiner[26] and elaborated on by Van Orden et al.[27] This theory emphasizes that thwarted belongingness is a major factor in suicidal behaviour when combined with a feeling that nothing can be done to overcome that lack of belongingness.

Studies have found protective associations of school connectedness and suicidal behaviours in adolescents,[28–35] and lower school connectedness has been shown to be associated with depression in adolescents in longitudinal studies.[36–38] Depression is a major risk factor for adolescent suicide,[7] and depression could thus explain the observed associations of school connectedness with adolescent suicidality. It also is known that male and female adolescents

Clinical Implications

- Health professionals providing services in schools should consider the potential benefit of increasing school connectedness for enhancing youth mental health.
- Clinicians should inquire about school attachment to determine its role when working with adolescents with mood disorders.

Limitations

- The cross-sectional nature of the study limits assignment of causality.
- Reverse causal effects could be at work; depressive symptoms could lead to social withdrawal, low school connectedness, and resultant suicidality.
- The self-report methodology may be subject to reporting bias.

Abbreviations

ASDUS	Atlantic Student Drug Use Survey
CES-D	Center for Epidemiologic Studies—Depression Scale
SES	socioeconomic status

differ by some correlates of depression, including stress and social support for females[39] and sexual abuse for males,[40] and that associations between school connectedness and increased risk of depression,[41] anxiety,[37] self-reported health,[16] and sexual risk behaviours[23,24] in adolescents differ by gender. However, measures of symptoms of depression have been examined in only 2 of the 8 studies of school connectedness and adolescent suicidality, both of which examined both genders together. The first of these studies measured depressed mood (for example, felt depressed or felt lonely),[28] while the second included measures of depressive symptoms, such as disturbed sleep.[30] Both studies found weak protective associations of school connectedness, using a scale similar to that used in this study.[42] Only one study has examined associations of school connectedness with suicidality separately for males and females,[34] finding protective associations of school connectedness with suicidality for both genders, but without adjusting for symptoms of depression. Our study sought to determine whether there are independent protective associations of higher school connectedness with suicidal behaviours in adolescents attending school in Atlantic Canada, while controlling for a range of potential confounders, including risk of depression; and, whether such associations differ by gender.

Methods

Sample

The 2012 ASDUS was a survey of students in public schools in grades 7, 9, 10, and 12 in 3 of Canada's Atlantic provinces (Nova Scotia, New Brunswick, and Newfoundland and Labrador). Students in both English- and French-language schools were included in the sample, while private schools, schools on reserves, students who had left school, and those who were not at school on the day scheduled for the survey were excluded. The sample design was a 2-stage stratified cluster sample of randomly selected classes that contained more than 20 students in each of the 4 grades surveyed (7, 9, 10, and 12). The sample allowed for each region to be proportionally represented within each grade; thereafter, the sample was allocated proportionately according to school size. Representing 90% of students present the days the surveys were administered, 9225 students responded. Among these students, 2147 females and 2218 males were in grade 10 and 12; these students are included in this analysis. Data were weighted to produce population estimates and to adjust for unequal probabilities of selection and student nonresponse.

The decision to require parental consent was made by individual schools, except for schools within the Halifax Regional School Board (Nova Scotia), where active parental consent was mandatory for all schools—all students in this school board area provided evidence of parental consent before being allowed to take part in the survey. Consent from each participating student was obtained at the time of the survey, whether parental consent had been required or not. Ethics approval was provided by the Dalhousie University Health Sciences Research Ethics Board.

Procedure

Surveys were completed in May and June 2012 by students in their classrooms, supervised by members of the research team who had been trained in sessions led by the study's Principal Investigators. The cover page of the survey gave students information about the purpose of the survey and its anonymous, confidential, and voluntary nature. Students were also informed that they could skip any questions they did not wish to answer and that they could decide to withdraw from participation at any time. Once students had completed their surveys, they were asked to place them in unmarked envelopes before giving them to research staff.

The survey instrument was derived from the prototype provided in the Canadian guidelines for self-reported adolescent drug use surveys, and it was validated prior to its initial use in 1993.[43] Other variables, added to the 2012 version, were, unless noted, validated for use in adolescents in previous work in Nova Scotia.[44]

Measures

Dependent variables

Suicidal ideation and suicide attempt were measured as ever having had these experiences in the previous year, based on questions from the Centers for Disease Control and Prevention's Youth Risk Behavior Survey.[45] Students were asked to respond yes or no to the question, "During the past 12 months, did you ever seriously consider attempting suicide?" Students who indicated they had seriously considered suicide in the previous year were defined as having had suicidal ideation. To assess suicide attempts, students were asked to indicate how many times they had attempted suicide in response to the question, "During the past 12 months, how many times did you actually attempt suicide?" Suicide attempt was defined as indicating having made one or more attempts in the previous year.

Covariates

Suicidal behaviour in adolescents is known to be associated with lower SES.[10] To measure this construct we used 2 measures: a self-rating of family status and mother's highest level of education. Students were asked to respond to the following:

> Imagine this ladder to the right shows how Canadian society is set up. At the top of the ladder are people who are the "best off"—they have the most money, the most education and the jobs that bring the most respect. At the bottom are the people who are "worst off"—they have the least money, little education, no job or jobs that no one wants. Now think about your family. Please fill in the bubble next to the box that best shows where you think your family would be on this ladder.

This variable was measured continuously on a scale ranging from 1 to 10, with a lower score meaning lower SES. Details about the validation of this measure have been published elsewhere.[46] Mother's level of education was measured by asking questions related to how much education students' mothers had obtained at high school, trade school, and college or university, and included a "no mother/don't know" response. This variable was dichotomized, with mother having completed university education as the reference category.

Children brought up by both of their birth parents are less likely to have emotional and psychological problems than those with other family structures.[47] Family structure was assessed by asking if students lived with both of their parents, one parent, one parent and a step-parent, or neither parent. This variable was dichotomized with living with other than both parents as the reference category.

Poorer academic performance is associated with adolescent suicidality.[5] Academic performance was assessed by asking students, "So far in this school year, what is your average on all your courses at school?" Marks of 80% or more (an A average) and those from 70% to 79% (a B average) were compared with the reference category of marks, less than 70% (a C average).

The ASDUS contained no direct measure of decision-making capacity, a factor associated with adolescent suicidality,[48] but did ask whether students had attended classes designed to increase decision-making ability. To determine if students had had any formal school classes in the current academic year that addressed making decisions, students were asked, "How many classes did you have in this school year that talked about decision making, peer pressure, assertiveness or refusal skills?" This variable was coded dichotomously so that having had one or more classes was coded as 1 and no classes as 0.

Depression is a major risk factor for adolescent suicidality.[10] To assess depressive symptoms, a previously validated 12-item version of the CES-D was used. The CES-D-12 asks about depressive symptoms in the 7 days prior to the survey. The 3 categories of elevated depressive symptoms are minimal (scores 0 to 11; the reference category), somewhat elevated (scores 12 to 20), and very elevated depressive symptoms (scores 21 to 36). Students with missing responses were considered indeterminate. The Cronbach alpha for this sample was 0.87. In referring to this categorical variable overall, we use the term risk of depression, as higher scores with this measure include more symptoms of depression, and thus more likelihood of the presence of depression.[49]

Self-rated health, which has been shown to be associated with suicidality in adolescents,[34] was assessed by asking students to rate their health on a 5-point scale, where 1 = poor and 5 = excellent.

Religious attendance is also known to be associated with adolescent suicidality.[11,12] Religious attendance was assessed by asking students, "How often do you attend religious services or events?"—with response options ranging from "never" to "at least once a week," dichotomized so that 1 represented more frequent attendance and 0 less frequent attendance.

Sexual orientation, a known risk factor for adolescent suicidality,[8,9] was assessed by asking students to respond to the question, "People have different feelings about themselves when it comes to questions of being attracted to other people. Which of the following best describes your feelings?"—followed by a series of 5 response options (completely heterosexual, mostly heterosexual, bisexual, mostly homosexual, and completely homosexual). This variable was examined dichotomously, with being completely heterosexual coded as 1 and other response options 0.

School connectedness was measured according to how strongly students agreed or disagreed with 3 statements (scale score range, 3 to 12, with higher score indicating higher school connectedness): "I feel close to people in my school"; "I am happy to be in my school"; and "I feel safe in my school." This scale was based on a scale developed for the US National Longitudinal Study of Adolescent Health.[42] The Cronbach alpha for this sample was 0.74.

Analysis

All analyses were carried out using Stata, version 17.[50] We first examined the dependent variables and the covariates by gender using the chi-square statistic. Next, univariate associations of the dependent and the covariates were assessed, stratified by gender, using logistic regression. The covariates, with the exception of risk of depression, were then entered into multiple logistic regression models stratified by gender. To determine whether associations of higher school connectedness remained independently protective for suicidality when risk of depression was considered, we entered risk of depression last into the final models.

Results

Table 1 shows the baseline data stratified by gender. Male students more often had a mother with high school education or less, while female students more frequently reported higher SES scores, higher mother's education, better school marks, taking a decision-making class in school in the previous year, attending religious services, and being at higher risk of depression. Females also reported both suicidal behaviours more often than males. There was no difference in mean school connectedness score by gender.

Tables 2 and 3 show the univariate associations of school connectedness, and covariates, with suicide outcomes for both female and male students. For females, higher school connectedness was negatively associated with suicidal ideation and suicide attempt. Other variables offering protective associations with these outcomes were higher SES score, living in a 2-parent family, having higher grades in school, and being completely heterosexual. Risk of

Table 1 Participant characteristics by gender

Variable	Females *n* = 2147 %	Males *n* = 2218 %	χ^2 or *t* test	*df*	*P*
SES score, mean (SD)	2.29 (0.68)	32.21 (0.68)	3.7223[a]	4363	<0.001
Living situation					
Two-parent family	76.48	77.01	0.1701	1	0.68
Single-parent family	723.52	22.99			
Mother's education					
≤High school	50.12	54.37	7.9242	1	0.005
Post-secondary	49.88	45.63			
Average school mark					
A	56.31	41.30			
B	25.57	23.35	99.0473	2	<0.001
≤C	18.12	35.35			
Took decision-making classes in past school year	77.97	70.11	35.0181	1	<0.001
Self-rated health fair to poor, compared with good to excellent	87.38	86.25	1.2137	1	0.27
Regular church attendance	29.11	22.05	28.632	1	<0.001
Totally heterosexual	82.25	83.63	1.3701	1	0.22
Risk of depression					
Minimal	58.97	74.12			
Somewhat elevated	22.92	14.02	28.6362	3	<0.001
Very elevated	10.95	2.48			
Indeterminate	7.17	9.38			
School connectedness score, mean (SD)	9.26 (2.01)	9.34 (1.86)	1.3757[a]	4363	0.17
Suicidal ideation	20.26	9.69	96.1265	1	<0.001
Suicide attempt	11.36	5.28	53.3291	1	<0.001

[a] Student *t* test

SES = socioeconomic status

depression and poorer self-reported health were associated with an increased risk of both outcomes.

For males, higher school connectedness was also negatively associated, and risk of depression positively associated, with both suicidal ideation and attempt. The only other variable with a consistent protective association with both outcomes was higher SES score. Living in a 2-parent family was protective for suicide attempt, while taking a decision-making class and poorer self-reported health were positively associated with suicidal ideation.

Tables 4 and 5 show the results of multiple variable regressions for females and males, respectively. In females, (Table 4) school connectedness was significantly protective for both suicidal ideation (OR 0.69; 95% CI 0.65 to 0.74) and suicide attempt (OR 0.72; 95% CI 0.66 to 0.78) in the multiple variable models before risk of depression was included in the analysis. In the final models, which included risk of depression, the protective association of school connectedness with suicidal ideation was reduced (OR 0.86; 95% CI 0.80 to 0.93) and the protective association for suicide attempt was weakened considerably (OR 0.90; 95% CI 0.82 to 1.00), though this association remained statistically significant.

In males, school connectedness was significantly associated with suicidal ideation (0.73; 95% CI 0.65 to 0.82) before risk of depression was added to the model. After the risk of depression variable was added, this association was reduced (OR 0.83; 95% CI 0.74 to 0.94). School connectedness, which was significant in the model for suicide attempt before risk of depression was added (OR 0.80; 95% CI 0.70 to 0.93), became insignificant in the final model (OR 0.95; 95% CI 0.81 to 1.12) after the addition of risk of depression.

Discussion

We examined associations of higher school connectedness with suicidal ideation and suicide attempt in the previous year in a representative sample of students in grades 10 and 12 in Atlantic Canada, looking at each gender separately and including risk of depression and other important covariates in our final models. We found that,

Table 2 Unadjusted associations of outcomes with the covariates in females

Variable	Suicidal ideation OR (95% CI)	*P*	Suicide attempt OR (95% CI)	*P*
Higher SES score	0.76 (0.63 to 0.91)	0.003	0.69 (0.57 to 0.84)	<0.001
Living in 2-parent, compared with single-parent, family	0.69 (0.50 to 0.96)	0.03	0.62 (0.43 to 0.89)	0.009
Mother's education: post-secondary, compared with high school or less	1.02 (0.77 to 1.36)	0.88	0.80 (0.58 to 1.11)	0.18
Average school mark				
≤C	1.0		1.0	
A	0.54 (0.40 to 0.75)	<0.001	0.40 (0.26 to 0.62)	<0.001
B	0.97 (0.66 to 1.48)	0.97	0.81 (0.50 to 1.30)	0.38
Took decision-making classes in past school year	1.32 (0.91 to 1.89)	0.14	1.12 (0.76 to 1.64)	0.58
Self-rated health fair to poor, compared with good to excellent	2.01 (1.33 to 3.06)	0.001	2.03 (1.27 to 3.25)	0.003
Regular church attendance	0.67 (0.49 to 0.91)	0.01	0.63 (0.40 to 1.01)	0.053
Totally heterosexual	0.60 (0.41 to 0.88)	0.009	0.50 (0.33 to 0.77)	0.002
Risk of depression				
Minimal	1.0			
Somewhat elevated	8.27 (5.56 to 12.32)	<0.001	9.38 (5.90 to 14.92)	<0.001
Very elevated	63.17 (37.25 to 107.11)	<0.001	41.71 (24.91 to 69.84)	<0.001
Indeterminate	1.10 (0.43 to 2.78)	0.85	0.39 (0.10 to 1.50)	0.17
Higher school connectedness score	0.67 (0.63 to 0.72)	<0.001	0.70 (0.64 to 0.75)	<0.001

SES = socioeconomic status

Table 3 Unadjusted associations of outcomes with the covariates in males

Variable	Suicidal ideation OR (95% CI)	*P*	Suicide attempt OR (95% CI)	*P*
Higher SES score	0.74 (0.58 to 0.95)	0.02	0.65 (0.44 to 0.95)	0.03
Living in 2-parent, compared with single-parent, family	0.85 (0.59 to 1.23)	0.39	0.50 (0.28 to 0.87)	0.02
Mother's education: post-secondary, compared with high school or less	1.10 (0.77 to 1.56)	0.60	0.63 (0.36 to 1.10)	0.10
Average school mark				
≤C	1.0		1.0	
A	1.11 (0.73 to 1.68)	0.62	1.17 (0.66 to 2.07)	0.56
B	1.28 (0.78 to 2.11)	0.32	1.19 (0.62 to 2.29)	0.61
Took decision-making classes in past school year	1.51 (1.05 to 2.16)	0.03	1.05 (0.59 to 1.86)	0.87
Self-rated health fair to poor, compared with good to excellent	1.66 (1.07 to 2.57)	0.02	0.80 (0.40 to 1.60)	0.52
Regular church attendance	1.29 (0.80 to 2.06)	0.29	1.06 (0.60 to 1.87)	0.84
Totally heterosexual	0.75 (0.54 to 1.06)	0.10	0.67 (0.38 to 1.19)	0.18
Risk of depression				
Minimal	1.0			
Somewhat elevated	6.72 (4.24 to 10.67)	<0.001	6.07 (3.64 to 10.13)	<0.001
Very elevated	38.16 (18.07 to 80.61)	<0.001	28.60 (12.54 to 65.21)	<0.001
Indeterminate	0.82 (0.36 to 1.88)	0.64	1.21 (0.41 to 3.56)	0.73
Higher school connectedness score	0.74 (0.66 to 0.82)	<0.001	0.80 (0.70 to 0.92)	0.002

SES = socioeconomic status

Table 4 Adjusted associations of outcomes with the covariates in females

Variable	Suicidal ideation OR (95% CI)	*P*	Suicide attempt OR (95% CI)	*P*
Higher SES score	1.01 (0.79 to 1.28)	0.95	0.97 (0.74 to 1.27)	0.81
Living in 2-parent, compared with single-parent, family	0.87 (0.55 to 1.38)	0.56	0.80 (0.51 to 1.26)	0.34
Mother's education: post-secondary, compared with high school or less	1.66 (1.14 to 2.41)	0.88	1.24 (0.87 to 1.76)	0.24
Average school mark				
≤C	1.0		1.0	
A	0.88 (0.50 to 1.56)	0.67	0.61 (0.33 to 1.13)	0.11
B	1.20 (0.63 to 2.31)	0.57	0.87 (0.51 to 1.49)	0.61
Took decision-making classes in past school year	1.01 (0.68 to 1.50)	0.95	0.84 (0.55 to 1.28)	0.41
Self-rated health fair to poor, compared with good to excellent	0.90 (0.54 to 1.51)	0.70	0.88 (0.55 to 1.41)	0.59
Regular church attendance	0.82 (0.59 to 1.14)	0.24	0.83 (0.54 to 1.30)	0.41
Totally heterosexual	0.68 (0.42 to 1.11)	0.13	0.66 (0.41 to 1.07)	0.10
Risk of depression				
Minimal	1.0			
Somewhat elevated	7.09 (4.79 to 10.50)	<0.001	7.76 (4.71 to 12.78)	<0.001
Very elevated	46.86 (26.28 to 83.57)	<0.001	29.77 (17.10 to 51.82)	<0.001
Indeterminate	1.01 (0.38 to 2.64)	0.99	0.27 (0.07 to 1.12)	0.07
Higher school connectedness score	0.69 (0.65 to 0.74)[a] 0.86 (0.80 to 0.93)[b]	<0.001 <0.001	0.72 (0.66 to 0.78)[a] 0.90 (0.82 to 1.00)[b]	<0.001 0.04

[a] Adjusted odds ratio before addition of Risk of Depression to model

[b] Adjusted odds ratio after addition of Risk of Depression to model

SES = socioeconomic status

among females, the protective associations of school connectedness, with both ideation and attempt, remained significant in the final models. Among males, the link between higher connectedness and suicide attempt was no longer significant when risk of depression was added to the model, while the protective association of higher school connectedness remained protective for suicidal ideation.

We are aware of only one other study that has examined such associations stratified by gender.[34] That study, which was a longitudinal examination of these relations, found that higher school connectedness at baseline predicted protection from suicide attempt at follow-up, for both genders, an average of 11 months after baseline data were gathered. However, that study adjusted only for age, family structure, and welfare status, and did not include a measure of risk of depression. Two previous studies of school connectedness and adolescent suicidality have included a measure of depressive symptoms. McNeely and Falci[28] examined transitions from no previous suicide attempt at time 1 to suicide attempt at time 2 (1 year apart) in 13 750 US adolescents in grades 7 to 12, finding a weak protective association of teacher support with decreased risk of suicide attempt, but showing only multivariate results. The second study showed weak protective associations of connectedness with suicidal ideation, but no protective effect for suicide attempt.[30] However, while that study did show that the independent protective association for ideation was weaker while adjusting for other covariates, the specific effect of adding depression to the models was not demonstrated. Such findings, and those of our study, suggest that the observed protective associations of higher school connectedness with adolescent suicidality may, at least in part, work through a lessening of depressive symptoms. This interpretation is supported by longitudinal studies that have found that higher school connectedness lowers symptoms of depression in adolescents.[18,37,38]

The data presented here also indicate that, for females, there remains a direct protective effect of higher school connectedness, for both suicidal ideation and suicide attempt, even when accounting for risk of depression. For males, school connectedness is also protective for ideation when risk of depression is considered. The protective associations of higher school connectedness for suicidality in adolescents after accounting for the presence of depressive symptoms suggests that enhancing school connectedness may be a useful universal strategy for preventing suicidal behaviours in adolescents. School connectedness appears to have a beneficial impact on suicidality for adolescents of both genders, including students at risk of depression as well as those not at such risk.

Table 5 Adjusted associations of outcomes with the covariates in males

Variable	Suicidal ideation OR (95% CI)	*P*	Suicide attempt OR (95% CI)	*P*
Higher SES score	0.86 (0.62 to 1.18)	0.35	0.82 (0.50 to 1.35)	0.44
Living in 2-parent, compared with single-parent, family	0.90 (0.60 to 1.35)	0.62	0.50 (0.27 to 0.93)	0.03
Mother's education: post-secondary, compared with high school or less	1.27 (0.85 to 1.89)	0.24	0.65 (0.33 to 1.29)	0.21
Average school mark				
≤C	1.0		1.0	
A	1.63 (0.99 to 2.69)	0.054	2.41 (1.24 to 4.68)	0.02
B	1.49 (0.83 to 2.67)	0.18	1.52 (0.07 to 3.31)	0.29
Took decision-making classes in past school year	1.64 (1.07 to 2.52)	0.02	1.14 (0.58 to 2.24)	0.71
Self-rated health fair to poor, compared with good to excellent	1.54 (0.89 to 2.67)	0.13	0.48 (0.21 to 1.14)	0.10
Regular church attendance	1.19 (0.75 to 1.91)	0.46	0.88 (0.49 to 1.56)	0.65
Totally heterosexual	0.71 (0.41 to 1.24)	0.23	0.80 (0.36 to 1.76)	0.57
Risk of depression				
Minimal	1.0			
Somewhat elevated	5.73 (3.58 to 9.17)	<0.001	5.76 (3.34 to 9.93)	<0.001
Very elevated	27.48 (12.78 to 59.10)	<0.001	31.26 (11.25 to 86.85)	<0.001
Indeterminate	0.68 (0.25 to 1.87)	0.45	0.98 (0.26 to 3.68)	0.97
Higher school connectedness score	0.73 (0.65 to 0.82)[a] 0.83 (0.74 to 0.94)[b]	<0.001 0.002	0.80 (0.70 to 0.93)[a] 0.95 (0.81 to 1.12)[b]	0.003 0.56

[a] Adjusted odds ratio before addition of Risk of Depression to model

[b] Adjusted odds ratio after addition of Risk of Depression to model

SES = socioeconomic status

The difference between males and females in suicide attempt seen here are not explained by higher school connectedness in females—males and females had similar levels of school connectedness. Previous work in Nova Scotia has found that higher levels of trust and helpfulness of others at school may be more protective for suicidality for females than males.[51] It may be that females are more able than males to mobilize the supports available to them, in this case the psychological support offered by feeling close to people at school, feeling happy to be in one's school, and feeling safe in school to protect directly against suicidality.[52] Future research on the role of school connectedness should include an examination of potential differential effects by gender.

School connectedness can potentially be enhanced. Four school-associated factors seem to contribute most to school connectedness: organizational structure (for example, smaller schools); functional aspects of schools (for example, clearly defined disciplinary expectations); the built environment of the school (for example, well-maintained facilities); and, interpersonal support (for example, positive relationships among students, and among staff, and students).[53] It is also recognized that individual-level factors, such as race and gender, and classroom-level factors, such as teacher characteristics, influence school connectedness.[54] An intervention study of elementary schools in Seattle, Washington, found that teacher training in classroom management to enhance school bonding, parent training to promote family and school bonding, and student training in social competence positively influenced students' feelings about their schools and increased school attachment.[55]

Our study has several limitations. Its cross-sectional nature limits interpretation of directionality and thus assignment of causality. It also could be that there are reverse causal effects at work in the associations seen here; the presence of depressive symptoms could lead to social withdrawal and isolation, leading to low school connectedness and resultant suicidality, although this is made less likely by observations of similar associations in longitudinal studies.[37,38] Also importantly, the scale used to measure school connectedness was, for logistical reasons, very brief. Though taken from an established instrument for measuring school connectedness[41] and internally consistent, is a very general indication of school connectedness. In addition, the self-report methodology may be subject to reporting bias. Finally, while suicidal behaviours were asked about during the previous year, symptoms of depression only asked about the last week, which would serve to weaken associations of those variables. Our study's strength is in its having a large sample size that is representative of students attending high school in the Atlantic provinces of Canada.

Conclusions

Given the controversy about the effectiveness of screening for depression in adolescents,[56] the lack of evidence about

the effectiveness of formal school-based programs for suicide prevention,[57] and the consensus about overall benefits of increasing school connectedness,[14] educators and mental health professionals who provide services in the school context should consider the potential benefit of enhancing school connectedness when designing interventions meant to maximize youth mental health. Recognizing the association of poor school connectedness with suicidality, clinicians should inquire about school attachment to determine its potential role when assisting individual adolescents with mood disorders.

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