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Adolescents' knowledge of a peer's non-suicidal self-injury and own non-suicidal self-injury and suicidality

Syed S, Kingsbury M, Bennett K, Manion I, Colman I. Adolescents' knowledge of a peer's non-suicidal self-injury and own non-suicidal self-injury and suicidality.

Objective: Some research suggests that suicidal ideation and attempt among adolescents may be contagious – that is adolescents who are exposed to peers' suicidal behaviour are more likely to experience suicidal ideation or attempt suicide themselves. Less is known about the potential contagion effect of non-suicidal self-injury (NSSI). Our objective was to determine whether knowledge of a friend's NSSI is associated with adolescent's own non-suicidal self-injury and suicidal behaviours.
Methods: Data from 1483 youth ages 14–17 years were obtained from the 2014 Ontario Child Health Study, a cross-sectional population-based survey of children and adolescents in Ontario, Canada. Logistic regression models were used to examine associations between knowledge of a friend's NSSI and adolescents' own self-reported self-injurious and suicidal behaviours. Interactions with gender, age group and presence of a mental disorder were investigated.
Results: Knowledge of a friend's non-suicidal self-injury was significantly associated with the adolescent's own non-suicidal self-injury (OR = 2.03, 95% CI 1.05–3.90), suicidal ideation (OR = 3.08, 95% CI 1.50–6.30) and suicide attempt (OR = 2.87, 95% CI 1.20–6.87).
Conclusion: These findings suggest an apparent contagion effect for non-suicidal self-injury. Awareness of a friend's self-injurious behaviours is associated with an adolescent's own self-injury and suicidality. Interventions aimed at preventing NSSI and suicidality should consider prevention of possible contagion at the school and/or community level.

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Key words: self-injurious behaviour; suicide; mental health; adolescence

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Significant outcomes

- We found evidence consistent with a contagion effect for adolescent non-suicidal self-injury
- Knowledge of a friend's NSSI was additionally associated with adolescent suicidal ideation and attempt
- These associations were not explained by adolescent mental disorder

Limitations

- The study relied on self-reported data
- The cross-sectional design suggests that care should be taken when interpreting results through a causal lens
- Information on some potential confounders, such as shared stressors between adolescents, was not available

Introduction

Non-suicidal self-injury (NSSI) is intentional, self-directed, non-culturally sanctioned damage of the body without the conscious intent of suicide, frequently including skin-cutting and scratching (1). NSSI is common among adolescents, with 12-month prevalence rates varying between 7.5% and 37.5% (2). Unlike self-injury, suicidal behaviours reflect an explicit intent to die, have higher lethality and tend to be less frequent (2). Risk of suicidal ideation and suicide attempt is higher among those who engage in NSSI (3, 4); a recent study reported that respondents who engaged in NSSI were four times more likely to be thinking about suicide and 22 times more likely to have attempted suicide compared to those who did not report engaging in NSSI (5).

It has been suggested that suicide may exert a contagion effect, whereby exposure to suicidal behaviours (i.e. suicidal ideation or attempt) influences identical behaviours in others (6, 7). Prevalence estimates have shown the contagion effect to primarily affect adolescents, accounting for 1% to 5% of youth suicides (7). A socialization model may assist in understanding the cause of suicide contagion, specifically in adolescent peer groups (8). According to this argument, exposure to high rates of suicide may normalize the behaviour and increase the probability that the adolescent will develop a positive definition of suicide, known as 'suicide acceptability' (8, 9). With this in mind, the adolescents may become more permissive towards suicidal behaviours. A large population-based study of Canadian adolescents found an association between exposure to suicide and a youth's own suicidal thoughts and attempts in those aged 12–17, regardless of whether the youth personally knew the individual who had died by suicide (10). Evidence from another study of 3302 adolescents between the ages of 14 and 22 indicated that knowing someone who attempted or died by suicide doubled the adolescent's odds of thinking about suicide and tripled the odds of planning a suicide (9). This study further explored the mediating role of suicide acceptability and found a partial mediation of the association between suicide exposure and the respondents' suicidal behaviours (9).

It is less clear if such contagion effects may apply to NSSI. A limited number of studies have examined the contagion effect of NSSI, however most of these studies were conducted in inpatient clinical samples (11, 12), did not control for important covariates, such as depression or anxiety, which may explain any observed contagion effect of NSSI, and did not examine gender and age differences.

Aims of the study

To address these limitations, the objective of this study was to examine the association between knowledge of a friend's NSSI and the survey respondent's own NSSI, suicidal ideation and suicide attempt in an adolescent population from Ontario, Canada.

Methods

Study sample

The 2014 Ontario Child Health Study (OCHS) is a provincially representative survey of families with children between 4 and 17 years of age in Ontario, Canada (13). Families residing in collective dwellings or on Indigenous reserves were excluded. Data were collected between 14 October 2014 and 15 October 2015. Questions about self-injurious behaviours and mental disorders were administered to adolescents between 14 and 17 years old (n = 1894) using a computer-based self-report questionnaire. Demographics were reported by the person most knowledgeable about the adolescent (parent or guardian). Adolescents who had complete data for questionnaires about socio-demographic factors, non-suicidal and suicidal behaviour, and mental health status were included in the study, reducing the eligible sample to 1483 adolescents. Parents and children were asked without coercion for their consent to participate. The study procedures were approved by the Hamilton Integrated Research Ethics Board at McMaster University and Research Ethics Committees at participating School Boards.

Measures

Friend's non-suicidal self-injury. Friend's NSSI was measured using an item derived from the Self-Injurious Thoughts and Behaviours Interview: (14) 'In the past 12 months, did any of your friends deliberately harm themselves but not mean to take their life?' Response options were yes or no.

Survey respondent's non-suicidal self-injury. Own NSSI was also measured using an item from the Self-Injurious Thoughts and Behaviours Interview (14): 'Sometimes people deliberately harm themselves but they do not mean to take their life. In the past 12 months, did you ever deliberately harm

yourself but not mean to take your life?' Response options were yes or no.

Survey respondent's suicidal ideation and attempt. Questions assessing suicidal ideation and suicide attempt were similar to those from the Composite International Diagnostic Interview (CIDI) (15). Suicidal ideation was measured using the following question: 'In the past 12 months, did you ever seriously consider taking your own life or killing yourself?' Response options were yes or no. If the participant responded with yes to suicidal ideation, they were asked about attempted suicide: 'How many times did you actually try to take your own life or kill yourself?' Responses were dichotomized to reflect respondents who had not attempted suicide versus those who had attempted suicide at least once.

Mental disorder. Mental disorders were derived from the Mini International Neuropsychiatric Interview for Children and Adolescents (MINI-KID) (16, 17) including: major depressive disorder, any anxiety disorder (generalized anxiety disorder, separation anxiety, social phobia and specific phobia), attention-deficit hyperactivity disorder, and oppositional defiant disorder or conduct disorder. All diagnoses for mental illness were assessed for the past six months, except conduct disorder, which was assessed for the past twelve months.

Socio-demographic factors. Parents/guardians reported on several socio-demographic factors including the following: age, gender, number of biological parents living in the home (0, 1 or 2), urban/rural residence and household income. For the present analyses, household income was dichotomized as above or below the low-income cut-off. The low-income cut-off is established by Statistics Canada and is based on family size and geographic location, and represents the point at which a family of the same size, living in the same area, would have difficulty affording basic needs. Three residence categories were created: urban (100 000 residents or greater), small-medium area (1000 to 99 999 residents) and rural (less than 1000 residents).

Analyses

We derived weighted estimates of descriptive statistics for socio-demographic variables, mental disorder variables, NSSI by a friend, and the index adolescent's NSSI, suicidal ideation and suicide attempt. Binomial logistic regression analyses were used to model associations between knowledge of a friend's NSSI and survey respondent's own NSSI, suicidal ideation and suicide attempt. Models were adjusted for gender, age, income (above vs. below low-income cut-off), number of biological parents living with the youth, residence (rural, small or medium population centre and urban) and presence of a mental disorder (major depressive disorder present versus absent; any anxiety disorder present vs. absent; conduct disorder/oppositional defiant disorder present versus absent; and attention-deficit hyperactivity disorder present versus absent), as these factors may be associated with both exposure and outcome. Interaction terms were additionally used to assess potential moderating effects of gender, age and mental disorders.

The sample was restricted to only those who had complete data across all study variables, resulting in a 22% reduction in sample size ($N = 1483$). We examined the impact on the associations as a result of missing data on mental disorder and non-suicidal and suicidal behaviour covariates. Using Pearson's chi-squared test, we examined whether the exposure variable, knowledge of a friend's NSSI, was associated with having missing data on covariates, including the respondent's NSSI, suicidal ideation, suicide attempt and mental disorders. Likewise, we assessed whether the outcomes (respondents' self-reported NSSI and suicidality) were associated with having missing data on covariates (socio-demographic factors and mental disorders). All analyses used bootstrap weighting procedures ($n = 1000$ bootstrap resamples) to account for the complex survey design. Analyses were implemented using SAS 9.4 (SAS Institute, Inc., Cary, NC).

Results

Girls were nearly three times more likely to report a friend's self-injurious behaviours compared to boys (33.7% vs. 13.2%; Table 1). With regards to their own behaviour, more girls than boys reported engaging in NSSI (11.4% vs. 3.4%), suicidal ideation (8.5% vs. 4.3%) and suicide attempts (4.8% vs. 2.3%).

Participants who were aware of a friend's NSSI differed from those who did not have knowledge of a friend's NSSI in terms of gender and age, mental disorders, and own non-suicidal and suicidal behaviours (Table 2). Respondents who met criteria for major depressive disorder and any anxiety disorder were also more likely to report having a friend engaging in self-injurious behaviours (20.4% and 28.6% respectively). Among those who had knowledge of a friend's NSSI, 15.8% engaged in their

Table 1. Characteristics of study participants in the 2014 OCHS study, (N = 1,483)†

Variables	Weighted proportions, %		
	Male (*n* = 740)	Female (*n* = 743)	Full Sample (*n* = 1483)
Age (years)			
14	24.1	24.2	24.2
15	22.8	23.7	23.3
16	26.6	26.2	26.4
17	26.5	25.8	26.1
Number of biological parents living in the home			
Both	68.2	63.2	65.7
One or none	31.8	36.8	34.3
Low-income measure (LIM)			
Household income above LIM	78.6	82.3	80.4
Household income below LIM	21.4	17.7	19.6
Residence			
Rural	11.5	14.2	12.8
Small or medium city centre	17.2	14.6	15.9
Urban	71.3	71.2	71.2
Mental health			
Major depressive disorder	**5.5**	**11.7**	8.6
Any anxiety disorders	**8.6**	**19.2**	13.9
Conduct disorder/oppositional defiant disorder	7.6	5.2	6.4
Attention-deficit hyperactivity disorder	7.6	4.5	6.1
Knowledge of a friend's NSSI	**13.2**	**33.7**	23.5
Engages in own NSSI	**3.4**	**11.4**	7.4
Has suicidal thoughts (suicidal ideation)	**4.3**	**8.5**	6.4
Has attempted suicide	**2.3**	**4.8**	3.6

NSSI, Non-suicidal self-injury.
†Bolded values represent statistically significant ($P < 0.05$) differences between two groups using the Rao-Scott chi-square test of Difference and *F*-test.

Table 2. Comparisons between no knowledge of friend's non-suicidal self-injury versus knowledge of friend's non-suicidal self-injury (N = 1,483)†

Variables	Weighted proportions, %	
	Friend has not engaged in NSSI (*n* = 1167)	Friend has engaged in NSSI (*n* = 316)
Age (years)		
14	**23.5**	**26.4**
15	**20.1**	**33.6**
16	**29.4**	**16.6**
17	**27.0**	**23.4**
Gender		
Male	**56.3**	**28.1**
Female	**43.6**	**71.9**
Number of biological parents living in the home		
Both	66.6	62.6
One or none	33.3	37.4
Low-income measure (LIM)		
Household income above LIM	79.6	83.0
Household income below LIM	20.2	17.0
Residence		
Rural	11.9	16.2
Small or medium city centre	15.4	17.9
Urban	72.7	66.4
Major depressive disorder	**5.0**	**20.4**
Any anxiety disorders	**9.5**	**28.6**
Conduct disorder/oppositional defiant disorder	6.1	7.6
Attention-deficit hyperactivity disorder	5.5	7.9
Engages in own NSSI	**4.9**	**15.8**
Has suicidal thoughts (suicidal ideation)	**3.6**	**15.7**
Has attempted suicide	**2.2**	**8.1**

NSSI, non-suicidal self-injury.
†Bolded values represent statistically significant ($P < 0.05$) differences between two groups using the Rao-Scott chi-square test of Difference and *F*-test.

own self-injury, 15.7% reported suicidal ideation, and 8.1% had both thought about and attempted suicide.

Knowledge of a friend's NSSI was associated with increased odds of the survey respondent's own NSSI, suicidal ideation and suicide attempt in unadjusted models (Table 3). After adjusting for socio-demographic factors, the associations between knowledge of a friend's NSSI and the survey respondent's non-suicidal and suicidal behaviours was attenuated; however, the association remained statistically significant (Model 2). After additionally adjusting for mental disorder (Model 3), knowledge of a friend's NSSI was associated with the survey respondent's own NSSI engagement (OR = 2.03, 95% CI 1.05–3.90), suicidal ideation (OR = 3.08, 95% CI 1.50–6.30) and suicide attempts (OR = 2.87, 95% CI 1.20–6.87).

No significant interactions with gender, age or mental disorder were found for the prediction of own NSSI or suicidal behaviours.

Survey respondents who were missing data on knowledge of a friend's NSSI were more likely to report engaging in NSSI compared to respondents without missing data. Respondents who were missing data on conduct disorder/oppositional defiant disorder were more likely to report suicidal ideation and suicide attempt compared to respondents without missing data on these covariates. Likewise, respondents who were missing data on

Table 3. Logistic regression model examining the association between knowledge of friend's non-suicidal self-injury and occurrence of own non-suicidal self-injury, suicidal ideation and suicide attempt, (*N* = 1483)†

Outcome	Model 1‡ OR [95% CI]	Model 2§ OR [95% CI]	Model 3¶ OR [95% CI]
Own non-suicidal self-injury	3.66 [2.05–6.55]	2.89 [1.58–5.29]	2.03 [1.05–3.90]
Own suicidal ideation	5.03 [2.69–9.43]	4.43 [2.31–8.48]	3.08 [1.50–6.30]
Own suicide attempt	4.02 [1.77–9.13]	3.93 [1.63–9.43]	2.87 [1.20–6.87]

OR, Odds Ratios; CI, Confidence Interval.
†$P < 0.05$ is shown in boldface and represents statistically significant associations.
‡Crude model, no covariates.
§Adjusted for socio-demographic factors (age, gender, number of biological parents living in the home, low-income measure and residency).
¶Adjusted for socio-demographic factors and mental health covariates (major depressive disorder; any anxiety disorder, that is separation anxiety disorder, generalized anxiety disorder, social phobia, specific phobia; conduct disorder/oppositional defiant disorder; and attention-deficit hyperactivity disorder).

major depressive disorder were more likely to attempt suicide compared to those without missing data. Since cell counts within the cross-tabulations did not meet the minimum requirement set by Statistics Canada, exact estimates could not be released.

Discussion

This large, population-based study found that awareness of a friend's self-injurious behaviour was associated with an adolescent's own engagement in non-suicidal self-injury, suicidal ideation and suicide attempts. Contrary to our expectations, meeting criteria for major depressive disorder did not increase adolescents' odds of engaging in non-suicidal and suicidal behaviours if aware of a friend's self-injury. In fact, meeting criteria for any of the included mental disorders did not serve to impact the association between knowledge of a friend's NSSI and the survey respondent's own self-harming behaviours. Similarly, neither gender nor age was a significant moderator of this relationship.

Although few population-based studies have sought to address the effect of awareness of a friend's NSSI on an adolescent's non-suicidal and suicidal behaviour, work in this field has assessed similar constructs. In an exploratory analysis of the correlates of NSSI, 38% of those engaging in self-injury reported getting the idea from a peer who also self-injured (18). A small longitudinal study of a community sample of adolescents reported that best friends' self-reported NSSI predicted adolescents' engagement in NSSI one year later (19). While most previous studies have focused on clinical samples (11, 12), our results present evidence of an apparent contagion effect of NSSI in peer groups in the general population. Our study is also strengthened by the inclusion of suicidal behaviours as secondary outcomes; our results provide evidence supporting the association between awareness of a friend's NSSI and adolescents' suicidal ideation and attempt.

Social learning is one possible mechanism explaining NSSI contagion (20). Even if an adolescent does not directly observe a friend's NSSI, simply discussing NSSI with one another or knowing that a friend engages in NSSI may be enough to positively reinforce an adolescent's own NSSI behaviours (21). Discussing NSSI among friends may serve as a bonding experience, further reinforcing this behaviour (22). In line with our results, findings from a study of 102 psychiatric inpatients suggested that if an adolescent knew about or even believed that their friend was engaging in NSSI, the adolescent was more likely to engage in their own NSSI (19).

An alternative, and one of the most commonly explored mechanisms, is the theory of assortative relating, which suggests that individuals with similar attitudes, qualities and vulnerabilities are more likely to form friendships (7, 23, 24). According to this argument, individuals at higher risk for non-suicidal and suicidal behaviours may form clusters with other at-risk individuals (23). If one individual endorses NSSI or suicidal behaviours, other vulnerable individuals in the peer group may also consider these behaviours, especially if the behaviour is normalized or accepted by the group (24). Some evidence has been advanced in favour of assortative relating as it applies to contagion of suicidal behaviours (25); however, findings have been inconsistent (26). Assortative relating due to the presence of mental disorders would be unlikely to explain the apparent contagion effect we observed, as we were able to adjust for numerous disorders common to adolescent populations.

In our study, female participants were more likely to report knowing about a friend's self-injuring behaviours, to engage in NSSI themselves and to report suicidal ideation and attempt. Results of previous studies suggest that girls within the same social groups are more likely to discuss NSSI behaviours and share similar attitudes about NSSI (19). Suicidal behaviours and NSSI are also significantly more common among females (27–30). Though gender was not a significant moderator of the associations between friends' and own NSSI, considering that girls are more likely to share conversations about NSSI with their peer groups and also experience a higher prevalence of non-suicidal and suicidal behaviours, contagion effects may be disproportionately affecting females.

Contrary to expectations and previous literature (31), presence of mental disorder was not a significant moderator of the associations between knowledge of a friend's NSSI and self-reported NSSI, suicidal ideation and suicide attempt. Our findings may have differed from other studies since adolescents who had both a mental disorder and reported knowledge of a friend's NSSI accounted for a very small proportion of the sample, reducing power for our moderation analysis.

Limitations and strengths

We acknowledge several limitations of the study. While we controlled for several important covariates, including socioeconomic status, rural/urban residence and presence of mental disorder, we were unable to consider other covariates known to be

associated with NSSI and suicidal outcomes. Possible confounding variables include shared stressors experienced by adolescents and their peers (32), interpersonal stressors (33), household environment and parenting (34), self-esteem factors (35), history of NSSI and suicidal behaviours (36), and family history of self-harm behaviours (3). Reliance on self-report data may have contributed to some bias in the results. Participants may have been reluctant to report on sensitive topics such as their mental health status, NSSI and suicidal behaviours (38). This may have contributed towards insignificant interactions between exposure to a friend's NSSI and mental health status. However, we would expect that any misclassification due to wilful misreporting would bias results towards the null.

Missing responses may have affected the validity of estimates in regard to the association between knowledge of a friend's NSSI and own non-suicidal and suicidal behaviours. For instance, respondents who had missing data on knowledge of a friend's NSSI were more likely to engage in self-injury. Respondents may not have had sufficient knowledge about a friend's NSSI because the peer group was not actively discussing personal non-suicidal and suicidal behaviours, indicating that the respondent's NSSI engagement was independent from a friend's NSSI. However, considering a very small number of the respondents engaging in NSSI had missing data on knowledge of a friend's NSSI, we cannot discount the apparent contagion effect. A possible explanation for this finding is these respondents may not belong to a peer group, and as such, could not provide information related to a friend's NSSI. These respondents may be engaging in NSSI in order to alleviate symptoms of distress or sadness associated with a lack of social connectedness with peers (39). Listwise deletion of missing data may also have resulted in a deviation from the representativeness of the original sample. As mentioned, participants with missing data on covariates were more likely to engage in suicidal ideation and attempt. Finally, we studied interactions between knowledge of a friend's NSSI and age, gender and mental disorders on our outcomes, finding no significant interactions. It is possible that we were unable to identify important interactions due to limited statistical power.

Nonetheless, the study has a number of strengths, such as the inclusion of a large population-based sample of adolescents. This study also used measures adapted from valid and reliable questionnaires. Additionally, this study used items specifically designed to assess suicidal ideation, suicide attempt and NSSI individually.

Future research using responses from both the adolescent and their peers may improve validity and reduce artificial inflation in the relationship between the variables. Furthermore, it may be important to consider the number of times a friend discloses information to the adolescent about their NSSI behaviours, as the frequency of indirect exposure to NSSI has been linked to differences in the rate of NSSI engagement (40). Prospective data could help in further establishing a link between the contagion effect and suicidal behaviours. Previous research has demonstrated that exposure to a schoolmate's suicide is associated with own suicide attempts two years later (10).

Implications

The current findings have several important implications. First and foremost, this study identifies NSSI exposure as a potential risk factor for adolescent engagement in NSSI and suicidal behaviours. Given the socialization effect of NSSI in adolescent friend groups, psycho-education, such as training in resistance to peer pressure, may help protect adolescents from NSSI contagion (41). Previous research has shown the efficacy of using this type of training in reducing health-risk behaviours (42).

Second, changing social norms to reduce the normalization and acceptability of NSSI and suicidal behaviours (via interventions in schools, communities or media) may alleviate susceptibility to NSSI contagion effects (38, 43, 44). Lastly, educating parents on the signs and symptoms of NSSI and suicidal behaviours is vital in identifying adolescents engaging in NSSI and suicidal behaviours, responding to these behaviours in an understanding and timely manner, and offering appropriate support to manage these behaviours, which may, in turn, mitigate the risk of suicide contagion (45).

To conclude, our study provides evidence consistent with a contagion effect of non-suicidal self-injury in a representative general population sample of adolescents. The findings from our study offer an important step towards understanding the effects of socialization, peer influence and contagion effects on the development of NSSI and other suicidal behaviours. Targeted intervention/postvention among adolescents exposed to NSSI may be effective in reducing self-harm and suicidal behaviours.

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Conflicts of interest

The authors have no conflicts of interest to declare.

Ethical approval

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

Peer Review

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Data availability statement

Data from the 2014 Ontario Child Health Study are freely available to researchers through Statistics Canada's Research Data Centre programme (www.statcan.gc.ca/eng/rdc/index).

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