Attempted Suicide Among Students and Young Adults in Montreal, Quebec, Canada: A Retrospective Cross-Sectional Study of Hospitalized and Nonhospitalized Suicide Attempts Based on Chart Review

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ABSTRACT

Objective: We conducted a chart review to identify postsecondary students and nonstudents in the same age range who presented to the emergency department following a suicide attempt to (1) compare demographic characteristics and suicide risk factors and (2) determine factors associated with more serious attempts requiring hospitalizations.

Method: The study was conducted in 1 tertiary trauma hospital and 1 community hospital affiliated with McGill University, Montreal, Quebec, Canada, between January 1, 2009, and March 31, 2010. Charts of patients with potential suicide attempts were identified from medical records using *ICD-10* codes that indicated traumatic injury, intentional self-harm, poisoning, and psychiatric or perception/cognition disorders and from the emergency department triage file using keywords that indicated suicidality or self-harm at presentation.

Results: In multivariable logistic regression models (odds ratio, 95% CI), students were younger (per 5-year increase: 0.22, 0.12–0.41), less likely to be born in Canada (0.17, 0.06–0.44), and more likely to use less violent methods (laceration, poisoning, other, multiple methods) versus more violent methods (collision, jump, fire burns, firearm, hanging) in their attempt. Fewer students had a history of substance abuse (0.12, 0.02–0.94) but were not different from nonstudents on history of other mental disorders. Less students attempted suicide in the winter/spring (January–April) versus fall (September–December) semester (0.32, 0.11–0.91). Students who attempted suicide were more likely to have family/social support. Those who attempted suicide in the previous year were more likely to require hospitalization for their current suicide attempt.

Conclusions: Knowledge of specific factors associated with suicide attempts in young people can help inform and guide suicide prevention efforts in both academic and community settings. Specific to the findings of this study regarding the method of suicide attempt used, for example, limiting access to dangerous substances or large quantities of medications may help prevent or reduce suicide attempts in this population.

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Suicide is the second leading cause of death in North America among people aged 15–34 years following accidental injury.[1,2] College years are a particularly vulnerable period for this population because of the pressure to succeed, increased financial burden, and added responsibility resulting from transitioning to adulthood. According to the Spring 2013 National College Health Assessment data for Canadian university and college students,[3] most students reported feeling overwhelmed by their studies, 10% seriously considered taking their own lives, and 1% attempted suicide during the past year. Although the rate of attempted suicide in college students has been reported to be half the national rate (7.5/100,000),[4] suicide in these young and promising individuals is particularly tragic and has devastating emotional and financial impacts on the family, peers, educational institution, and society. Preexisting or predisposition to mental disorders among students, failure to seek help, and lack of knowledge about available mental health services on campus have all been reported to contribute to suicide attempts in this population.[4–7] Among young people, rates of suicidal thoughts but not behavior are higher among females, vary by age and ethnicity,[8] and increase with a personal or family history of mental disorders.[9] Among those who commit or attempt suicide, depression is the most prevalent mental disorder reported.[10]

Suicide risk factors among postsecondary (college or university) students in comparison to nonstudents of similar age have not been well characterized because of the absence of comprehensive data on suicide attempts in this population. Substance abuse,[11] less family support, and more financial and societal stress[10,12,13] as well as Asian versus white and international student status have been found to be factors that increase risk of suicidal behavior in students.[14] However, only a small proportion of students who report suicidal behavior have

Clinical Points

- In an urban setting, about one third of young adults aged 18–36 years who received medical attention for attempted suicide were postsecondary students; over two thirds of students who attempted suicide requiring medical attention were female.
- Students were more likely to attempt suicide in the fall compared to the winter/spring semester; the 2 most common methods of suicide among students were poisoning and laceration.
- Students who attempted suicide were less likely than nonstudents to have a history of substance abuse and more likely to have family/social support.
- Students who attempted suicide in the previous year were more likely to require hospitalization for their current suicide attempt.

actually attempted suicide.[10] Published data[15] concerning suicide attempts among postsecondary students have been inconsistent in their definition of an attempt. They have considered inclusion criteria ranging from suicide planning to self-reported attempts not requiring medical attention to attempts requiring hospitalization. The relatively low incidence of suicide attempts among postsecondary students, the nature of self-report data, the selection and participation biases inherit in survey data, and, finally, the wide variation of suicide attempt case definitions have precluded a robust assessment of the characteristics of suicide attempters in this population.[4,10,16,17]

Among individuals who presented to the emergency department (ED) of 2 adult general hospitals in Montreal, Quebec, Canada, following a suicide attempt, we identified postsecondary students and nonstudents in the same age range and (1) compared demographic characteristics and suicide risk factors between the 2 groups and (2) determined factors associated with more serious attempts requiring hospitalization.

METHOD

Study Design and Sample

A retrospective chart review of potential cases of attempted suicide was conducted. Potential cases were all individuals who presented to the ED of 2 general hospitals (1 tertiary trauma McGill University teaching hospital and 1 community hospital affiliated with McGill University) between January 1, 2009, and March 31, 2010. Study hospitals along with 2 other adult teaching hospitals are located in close proximity to 3 major university campuses in Montreal and a few colleges. Cases of suicide attempts were identified from hospital medical records and the ED nursing triage file. Case selection for chart review involved generating a list of probable *ICD-10* revision codes indicating suspicious injury or behavior such as neck injury, poisoning, intentional self-harm, reaction to severe stress, adjustment disorders, and others to identify patients who received at least 1 of these codes as principal or secondary diagnosis or external cause of hospitalization in their hospital record (Table 1). This list included a broad range of codes to maximize the likelihood of capturing all suicide attempts at the expense of reviewing more negative charts. In addition, the electronic ED triage file was used to identify all patients who had an indication of suicidality or self-harm at ED presentation. Paper charts of the identified patients were retrieved, and all medical and nursing notes were reviewed.

Inclusion/Exclusion Criteria

Individuals who attempted suicide as identified by chart review were eligible for this study if they were postsecondary students or nonstudents in the same age range as the eligible students. Homeless individuals were excluded because they differ substantially from students on sociocultural and mental health disorder risk factors.

Study Procedures

Chart review. In all Quebec hospitals, patients who arrive to the ED undergo a triage assessment to determine the priority of their needs.[18] According to ED management guidelines, triage is conducted by an experienced nurse and follows the Canadian Emergency Department Triage and Acuity Scale[19,20]; the ED triage nurse is trained to recognize suicidal patients and is present in the ED at all times. A suicide management protocol is followed for the evaluation, treatment, management, and follow-up of suicidal patients. Software accredited by the Ministry of Health, Quebec, Canada, is used for ED triage.[18]

A suicide attempt was defined as explicit documentation of attempted suicide recorded by at least 2 different health care professionals during that episode of care (ED visit for those discharged from the ED or hospitalization for those admitted to the hospital). The first 20 cases identified were audited by our team to confirm the validity of the identification method. Ethics approval for chart review was obtained from the McGill University Health Centre Ethics Board, Montreal, Quebec, Canada.

Patient Characteristics at Baseline

Patient characteristics assessed from the charts included sociodemographic and sociocultural factors including age, sex, country of birth, ethnicity, employment status, living status (alone, with parent[s], or with spouse/partner/roommate), education level attained, and presence of social/family support; family history of mental disorders and suicidal behavior; suicide methods used in the attempt; history of mental disorders including major depressive episode, bipolar disorder, schizophrenia, panic disorder, generalized anxiety disorder, antisocial personality disorder, borderline personality disorder, and alcohol/drug abuse; previous suicide attempts; comorbidities (eg, cancer, cardiovascular disease, hepatitis, HIV, epilepsy, chronic pain, and others as recorded in the chart); and number of days in the hospital and mortality during that episode of care.

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Table 1. Charts Selected and Suicide Attempt Cases Identified Using Hospital Medical Records and Emergency Department Triage Files[a]

Chart Review	*ICD-10* Codes and Keywords	Total Charts Reviewed	All Suicide Attempts, n (%)	Suicide Attempts Included, n (%)[b]
Charts and suicide attempt cases		5,746	369 (6.4)	186 (3.2)
Hospital medical record				
Intentional self-harm	X60–X84 or Y87.0	104	89 (85.6)	41 (39.4)
Poisoning/toxic effect of unspecified substances	R78, T36–T65	96	13 (13.5)	5 (5.2)
Injury (neck, multiple)	S10–S19, T00–T07, T79	353	6 (1.7)	2 (0.6)
Undetermined intent and sequelae of external causes	Y10–Y34, Y40–Y89 (excludes Y87.0), T90–T98	2,357	8 (0.3)	3 (0.1)
Cognition perception	R44–R46	92	28 (30.4)	10 (10.9)
Psychiatric disorders	F10–F19, F25, F30–F39, F43, F53, F60.3[c]	921	32 (3.5)	14 (1.4)
Emergency department triage file	*suicid*, attempt, *OD*, *overdo*; *gun*, *intox*; *poison*, *stab*, *jump*, *hang*, *hung*, *self*, *shoot*, *shot*, *slash*, *cut*, *mutilat*[d]	1,823	193 (10.6)	111 (6.1)

[a]*ICD-10* codes and number of charts are displayed in a mutually exclusive descending order.
[b]Includes all postsecondary students and nonstudents within the same age range (18–36 y) and excludes homeless individuals. For patients with multiple attempts in the study period, only the last attempt was included.
[c]F10–F19 = mental and behavioral disorders due to psychoactive substance use, F25 = schizoaffective disorders, F30–F39 = mood (affective) disorders, F43 = reaction to severe stress and adjustment disorders, F53 = mental and behavioral disorders associated with the puerperium not elsewhere classified, F60.3 = emotionally unstable personality disorder.
[d]Similar keywords in the French language were also used.

Statistical Analyses

Descriptive statistics (means, medians, and proportions as appropriate) were used to summarize characteristics of students versus nonstudents. Multivariable logistic regression models were used to compare patient characteristics between students and nonstudents. Patient characteristics listed previously were considered in the models if statistically significant in the univariate analyses at the 25% level and were kept in the model if statistically significant at the 5% level.[21] The Schwarz information criterion was used to select the final model. Multivariable logistic regression models were used to compare the risk of hospitalization following the attempt in students and nonstudents combined. Similar model selection criteria as those mentioned previously were used. Multivariable logistic regression models were also used to identify factors associated with the risk of being hospitalized for 1 week or more (the median in-hospital days among those hospitalized).

The proportion of patients with missing data was low (less than 5%) for most key variables. Accounting for missing data through multiple imputations did not change the results of the models and will not be discussed further. All analyses were performed using SAS 9.4 for Linux (SAS Institute, Inc, Cary, North Carolina).

RESULTS

A total of 5,746 charts were reviewed, and 369 patients (aged 17–87 years) with suicide attempts were identified (Table 1). Of these, 61

Table 2. Patient Sociodemographic and Clinical Characteristics in Postsecondary Students and Nonstudents of the Same Age Range[a]

Characteristic	Students	Nonstudents	Total
Total patients	61 (33)	125 (67)	186 (100)
Female	43 (70)	74 (59)	117 (63)
Age, median (IQR), y	22 (20–24)	27 (24–31)	25 (21–29)
Citizenship			
Canadian born	28 (46)	91 (73)	119 (64)
Canadian citizens/permanent residents[b]	47 (77)	113 (90)	160 (86)
Student visa	13 (21)	0	13 (7)
Ethnicity			
White	32 (52)	77 (62)	109 (59)
Asian	13 (21)	9 (7)	22 (12)
Arab	6 (10)	8 (6)	14 (8)
Black	4 (7)	10 (8)	14 (8)
American Indian	0	11 (9)	11 (6)
Latin American	2 (3)	5 (4)	7 (4)
Other	4 (7)	5 (4)	9 (5)
Level of education achieved			
Students (current level)			
College (2 y)	19 (31)	…	19 (10)
University	42 (69)	…	42 (23)
Nonstudents (level achieved)			
< High school	…	62 (50)	62 (33)
High school	…	35 (28)	35 (19)
College	…	7 (6)	7 (4)
University	…	16 (13)	16 (9)
Other (professional diploma)	…	5 (4)	5 (3)
Employed			
Full-time	…	45 (36)	45 (24)
Part-time	…	10 (8)	10 (5)
Self-employed	…	2 (2)	2 (1)
Unemployed	…	66 (53)	66 (35)
Other	…	2 (2)	2 (1)
Marital status			
Single	44 (72)	69 (55)	113 (61)
Married	3 (5)	7 (6)	10 (5)
Divorced/separated	5 (8)	14 (11)	19 (10)
Widowed	0	1 (1)	1 (0.5)
Engaged/cohabitating	6 (10)	24 (19)	30 (16)
Unknown	3 (5)	10 (8)	13 (7)
Children			
0	54 (89)	85 (68)	139 (75)
≥ 1	1 (2)	28 (22)	29 (16)
Unknown	6 (10)	12 (10)	18 (10)

(continued)

Table 2 (continued). Patient Sociodemographic and Clinical Characteristics in Postsecondary Students and Nonstudents (controls) of the Same Age Range[a]

Characteristic	Students	Nonstudents	Total
Living status			
With 1 or both parents	23 (38)	28 (22)	51 (27)
With roommate/spouse or partner	25 (41)	60 (48)	85 (46)
Alone	13 (21)	37 (30)	50 (27)
History of any mental disorder	33 (54)	88 (70)	121 (65)
Axis I	30 (49)	83 (66)	113 (61)
Depression	27 (44)	41 (33)	68 (37)
Substance abuse	4 (7)	34 (27)	38 (20)
Schizophrenia	0	13 (10)	13 (7)
Bipolar disorder	1 (2)	5 (4)	6 (3)
Other	4 (7)	15 (12)	19 (10)
Axis II	12 (20)	24 (19)	36 (19)
Borderline personality disorder	8 (13)	15 (12)	23 (12)
Unspecified disorders	1 (2)	4 (3)	5 (3)
Attempt in past year	17 (28)	25 (20)	42 (23)
Any mental disorder in family	16 (26)	46 (37)	62 (33)
Mother/father	15 (25)	40 (32)	55 (30)
Depression in family	13 (21)	21 (17)	34 (18)
Mother	13 (21)	17 (14)	30 (16)
Suicide in family	1 (2)	9 (7)	10 (5)
Comorbidity	16 (26)	26 (21)	42 (23)
Cancer	1 (2)	2 (2)	3 (2)
Respiratory	3 (5)	8 (6)	11 (6)
Chronic pain	3 (5)	1 (1)	4 (2)
Diabetes	0	2 (2)	2 (1)
Hepatitis	0	1 (1)	1 (0.5)
Thyroid	1 (2)	5 (4)	6 (3)
HIV	1 (2)	0	1 (0.5)
Inflammatory bowel disease	3 (5)	0	3 (2)
Other (eg, epilepsy, cardiovascular disease, brain injury)	5 (8)	8 (6)	13 (7)
Died in hospital	0	2 (2)	2 (1)
Method used			
Poisoning	42 (69)	60 (48)	102 (55)
Laceration	17 (28)	22 (18)	39 (21)
Collision/jump/fire burns/firearm	5 (8)	24 (19)	29 (16)
Hanging/strangulation	5 (8)	14 (11)	19 (10)
Other	1 (2)	9 (7)	10 (5)
Social/family support	33 (54)	27 (22)	60 (32)
Admission to hospital at presentation	21 (34)	59 (47)	80 (43)
In-hospital days, total (median) [IQR]	300 (1) [0–5]	1,126 (1) [0–6]	1,426 (1) [0–6]
0	24 (39)	33 (26)	57 (31)
1–2	16 (26)	44 (35)	60 (32)
3–9	11 (18)	28 (22)	39 (21)
≥ 10	10 (16)	20 (16)	30 (16)
Time of attempt			
September–December 2009	21 (34)	29 (23)	50 (27)
January–April 2009	15 (25)	33 (26)	48 (26)
May–August 2009	12 (20)	37 (30)	49 (26)
January–March 2010	13 (21)	26 (21)	39 (21)

[a]Data are presented as n (%) unless otherwise specified.
[b]Permanent residents are mostly immigrants who have not yet obtained the Canadian citizenship, but have all civil rights as Canadian citizens.
Abbreviation: IQR = interquartile range.

Table 3. Characteristics That Differed Between Postsecondary Students Versus Nonstudents

Characteristic	Odds Ratio (95% CI)[a]
Age (per 5-y increase)	0.22 (0.12–0.41)
Born in Canada	0.17 (0.06–0.44)
History of any mental disorder	
No mental disorder	1 (reference)
Depression	1.37 (0.52–3.64)
Substance abuse	0.12 (0.02–0.94)
Other	0.26 (0.06–1.21)
Method used	
Collision/jump/fire burns/ firearm/hanging[b]	1 (reference)
	5.43 (1.16–25.37)
Laceration	4.10 (1.16–14.47)
Poisoning	14.00 (0.62–315.79)
Other	9.46 (1.87–47.74)
≥ 2 methods used	
Time of attempt	
September–December	1 (reference)
January–April	0.32 (0.11–0.91)
May–August	0.58 (0.17–1.96)
Social/family support	3.23 (1.33–7.81)

[a]The model used logistic regression. All characteristics listed in Table 1 were tried for inclusion. Those significant at the .05 level were kept.
[b]This category was chosen as the reference category to compare less violent to more violent methods.

were postsecondary students aged 18–36 years and 125 were nonstudents in the same age range (5 nonstudents were homeless and were excluded). Therefore, 186 individuals were eligible and included and 183 were not used in this study. Table 2 displays patient characteristics of students versus nonstudents. Students' ages were (median, interquartile range reported in lower and upper quartiles) 22, 20–24 versus 27, 24–31 years. Among students, 70% (vs 59%) were women, 46% (vs 73%) were born in Canada, and 52% (vs 62%) were white. Most students were single, and over one third of them were living with their parents. Poisoning was the method of most attempts for both students and nonstudents followed by laceration. Because of few cases, collision, jump, fire burns, firearm injuries, and hanging/strangulation were grouped into 1 category. About half of the students had a history of mental disorder, mostly depression, and over a quarter of them had a mental illness in the family (all [100%] had a mother with depression) (Table 2).

In multivariable logistic regression models (odds ratio [OR], 95% CI), students were younger (per 5-year increase: 0.22, 0.12–0.41), less likely to be born in Canada (0.17, 0.06–0.44), and more likely to use less violent methods (laceration, poisoning, other, multiple methods) versus more violent methods (collision, jump, fire burns, firearm, hanging) in their attempt. Fewer students had a history of substance abuse (0.12, 0.02–0.94) but were not different from nonstudents on history of other mental disorders. Less students attempted suicide in the winter/spring (January–April) versus fall (September–December) semester (0.32, 0.11–0.91) (Table 3).

In total, 80 patients (43%) were hospitalized (Table 4): 34% of students and 47% of nonstudents (Table 2). The risk (OR, 95% CI) of making an attempt that required hospitalization increased with age (for every 5-year increase: 1.45, 1.01–2.07). Individuals living with someone other than their parents (roommate/spouse/partner) were less likely to attempt a suicide requiring hospitalization than those living with 1 or both parents (0.32, 0.14–0.76); the risk of requiring hospitalization was not different between those living alone and those living with 1 or both parents. Those who

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used poisoning and laceration methods were less likely to require hospitalization compared to those who used more violent methods (collision, jump, fire burns, firearm, hanging). In addition, those who attempted suicide in the previous year were more than 3 times as likely to require hospitalization as those who did not. The risk of being hospitalized did not differ between students and nonstudents (Table 5).

Study patients spent 1,371 days in the hospital and 55 days in the ED (Table 4). Among the 80 individuals who were hospitalized, 45 were hospitalized for 1 week or more. Individuals who attempted suicide in the previous year were more than 5 times as likely to be hospitalized for 1 week or more compared to individuals who did not, while those who used poisoning or laceration versus more violent methods of suicide (collision, jump, fire burns, firearm, hanging) were less likely to be hospitalized for 1 week or more (Table 6).

Table 4. Demographic and Clinical Characteristics in Hospitalized Versus Nonhospitalized Students and Nonstudents Combined[a]

Characteristic	Nonhospitalized	Hospitalized	Total
Total patients	106 (57)	80 (43)	186 (100)
Female	72 (68)	45 (56)	117 (63)
Age, median (IQR), y	24 (21–28)	26 (22–30)	25 (21–29)
Citizenship			
Canadian born	66 (62)	53 (66)	119 (64)
Canadian citizens/permanent residents[b]	90 (85)	70 (88)	160 (86)
Student visa	8 (8)	5 (6)	13 (7)
Ethnicity			
White	61 (58)	48 (60)	109 (59)
Asian	15 (14)	7 (9)	22 (12)
Arab	5 (5)	9 (11)	14 (8)
Black	9 (8)	5 (6)	14 (8)
American Indian	6 (6)	5 (6)	11 (6)
Latin American	3 (3)	4 (5)	7 (4)
Other	7 (7)	2 (3)	9 (5)
Level of education (current level)			
College (2 y)	12 (11)	7 (9)	19 (10)
University	28 (26)	14 (18)	42 (23)
Nonstudents (level achieved)			
< High school	35 (33)	27 (34)	62 (33)
High school	18 (17)	17 (21)	35 (19)
College	2 (2)	5 (6)	7 (4)
University	7 (7)	9 (11)	16 (9)
Other (professional diploma)	4 (4)	1 (1)	5 (3)
Employed			
Full-time	23 (22)	22 (28)	45 (24)
Part-time	6 (6)	4 (5)	10 (5)
Self-employed	0	2 (3)	2 (1)
Unemployed	36 (34)	30 (38)	66 (35)
Student	40 (38)	21(26)	61 (33)
Other	1 (1)	1 (1)	2 (1)
Marital status			
Single	60 (57)	53 (66)	113 (61)
Married	8 (8)	2 (3)	10 (5)
Divorced/separated	10 (9)	9 (11)	19 (10)
Widowed	1 (1)	0	1 (0.5)
Engaged/cohabitating	19 (18)	11 (14)	30 (16)
Unknown	8 (8)	5 (6)	13 (7)
Children			
0	78 (74)	61 (76)	139 (75)
≥1	18 (17)	11 (14)	29 (16)
Unknown	10 (9)	8 (10)	18 (10)

(continued)

DISCUSSION

Our study compared postsecondary students to nonstudents of similar age who attempted suicide and presented to the ED of 1 general tertiary trauma hospital and 1 general community hospital in Montreal between January 2009 and March 2010. About one third of our study subjects were students, and the majority of them were female. Students were younger than nonstudents. Students were less likely to be born in Canada and to have a history of substance abuse and more likely to have family/social support. Students also were more likely to have used laceration or poisoning versus more violent methods of suicide and to have attempted suicide during the fall versus winter/spring semester.

Several authors have found that college years are particularly stressful for students[6,22–25] and that elevated stress and vulnerability to mental illness are manifest by high rates of suicidal ideation and behavior.[4,26,27] The actual rate of attempted suicide among postsecondary students is not well known because of the difficulty in tracking students who have attempted suicide[16] and because of the inherent reporting and selection biases in studies using survey data.[4] In a web-based survey of college students,[4] 1% of undergraduates and 0.3% of graduates reported having attempted suicide in the past year. Among those, 19% of undergraduates and 28% of graduates required medical attention. Our study included only suicide attempts that required medical attention and were treated in either an ED or hospital setting in an urban area. Therefore, direct comparison of our results to those from survey studies should be done with caution.

Of the postsecondary students in our study, 70% were female. Although this proportion was not statistically different from that among nonstudents (59%), it was statistically higher than the reported proportion of females (58%) enrolled in postsecondary education in Quebec in 2009.[28,29] Further examination of our data did not provide additional insight that could explain the higher rate of female students who attempted suicide compared to that among enrolled postsecondary students. Published data regarding sex differences among postsecondary students concerning suicidal thoughts and behavior are not consistent. While some studies reported a higher rate of suicidal thoughts but not behavior among female students,[8] others reported no difference on suicidal thoughts[30] or attempts in the previous year.[31] However, these studies were based on student surveys, and participation was much higher among females versus males, which may have biased the results. For example, in Garlow et al,[31] 72% of participants were female, while the student population of the university was only 56% female. Interestingly, in that study,[31] the number of females

Table 4 (continued). Demographic and Clinical Characteristics in Hospitalized Versus Nonhospitalized Students and Control Nonstudents Combined[a]

Characteristic	Nonhospitalized	Hospitalized	Total
Living status			
With 1 or both parents	25 (24)	26 (33)	51 (27)
With roommate/spouse	60 (57)	25 (31)	85 (46)
Alone	21 (20)	29 (36)	50 (27)
History of any mental disorder	64 (60)	57 (71)	121 (65)
Axis I disorder	59 (56)	54 (68)	113 (61)
Depression	38 (36)	30 (38)	68 (37)
Substance abuse	23 (22)	15 (19)	38 (20)
Schizophrenia	2 (2)	11 (14)	13 (7)
Bipolar disorder	3 (3)	3 (4)	6 (3)
Other	10 (9)	9 (11)	19 (10)
Axis II disorder	20 (19)	16 (20)	36 (19)
Borderline personality disorder	14 (13)	9 (11)	23 (12)
Unspecified	3 (3)	2 (3)	5 (3)
Attempt in past year	17 (16)	25 (31)	42 (23)
Any mental disorder in family	31 (29)	31 (39)	62 (33)
Mother/father	30 (28)	25 (31)	55 (30)
Depression in family	16 (15)	18 (23)	34 (18)
Mother	15 (14)	15 (19)	30 (16)
Suicide in family	3 (3)	7 (9)	10 (5)
Comorbidity	21 (20)	21 (26)	42 (23)
Cancer	1 (1)	2 (3)	3 (2)
Respiratory	8 (8)	3 (4)	11 (6)
Chronic pain	3 (3)	1 (1)	4 (2)
Diabetes	0	2 (3)	2 (1)
Hepatitis	0	1(1)	1 (0.5)
Thyroid	1 (1)	5 (6)	6 (3)
HIV	0	1 (1)	1 (0.5)
Inflammatory bowel disease	3 (3)	0	3 (2)
Other (eg, epilepsy, cardiovascular disease, brain injury)	6 (6)	7 (9)	13 (7)
Died in hospital	0	2 (3)	2 (1)
Method used			
Poisoning	68 (64)	34 (43)	102 (55)
Laceration	27 (25)	12 (15)	39 (21)
Collision/jump/fire burns/firearm	6 (6)	23 (29)	29 (16)
Hanging/strangulation	7 (7)	12 (15)	19 (10)
Other	5 (5)	5 (6)	10 (5)
Social/family support	36 (34)	24 (30)	60 (32)
In-hospital days, total (median) [IQR]	55 (0) [0–1]	1,371 (7) [4–18]	1,426 (1) [0–6]
0	56 (53)	1 (1)[c]	57 (31)
1–2	50 (47)	10 (13)	60 (32)
3–9	…	39 (49)	39 (21)
≥ 10	…	30 (38)	30 (16)
Time of attempt			
September–December 2009	25 (24)	25 (31)	50 (27)
January–April 2009	29 (27)	19 (24)	48 (26)
May–August 2009	26 (25)	23 (29)	49 (26)
January–March 2010	26 (25)	13 (16)	39 (21)

[a]Data are presented as n (%) unless otherwise specified.
[b]Permanent residents are mostly immigrants who have not yet obtained the Canadian citizenship, but have all civil rights as Canadian citizens.
[c]This person died shortly after admission.
Abbreviation: IQR = interquartile range.

Table 5. Factors Associated With Suicide Attempts Requiring Hospitalization Among Students and Nonstudents Combined

Factor	Odds Ratio (95% CI)[a]
Age (per 5-y increase)	1.45 (1.01–2.07)
Living status	
Lives with 1 or both parents	1 (reference)
Lives alone	0.93 (0.36–2.38)
Lives with roommate spouse or partner	0.32 (0.14–0.76)
Attempt in past year	3.75 (1.64–8.55)
Method used	
Collision/jump/fire burns/ firearm/hanging	1 (reference)
Laceration	0.13 (0.04–0.41)
Poisoning	0.17 (0.07–0.43)
Other	0.25 (0.04–1.71)
≥ 2 methods used	0.22 (0.06–0.75)

[a]The model used logistic regression. All characteristics listed in Table 4 were tried for inclusion. Those significant at the .05 level were kept. "Student" was not a significant variable and was removed.

(n = 95) who reported having attempted suicide in the previous year was much higher than that of males (n = 25), which corroborate the numbers found in our study. Further studies are needed to examine sex differences in suicide attempts among postsecondary students.

In our study, students were more likely to attempt suicide in the fall compared to the winter/spring semester. This finding may be explained perhaps by the higher level of stress at the time of enrollment. However, this assumption cannot be verified in our data, as the year of enrollment was not indicated in the charts. Another study[32] has reported a higher risk of suicidal ideation in the summer compared to both fall and winter/spring semesters. However, results from that study[32] cannot be directly compared to ours, as very few suicidal ideations translate into actual attempts.[10] In addition, it is possible that the rate of suicide attempts among students treated in our study hospitals during summer was underestimated because some students may have moved from the region during their summer vacation.

In our study, students were less likely to be born in Canada compared to nonstudents, and about 21% of them were international compared to an 11% proportion of international students registered in Quebec colleges and universities in 2009, a proportion that varies between universities and is much higher in Montreal compared to universities in other Quebec regions.[29] Although we cannot determine from our sample if the risk of suicide attempt in the postsecondary student population in general differed between those born in Canada and those born elsewhere, students not born in Canada are more likely to be immigrants and therefore more likely to have financial and societal stress; students with more financial and societal stress[10,12,13] as well as international students are at increased risk of suicidal behavior.[14]

An association between maternal depression and suicidal behavior among college students has been reported.[33] In our study, maternal depression was not different between students and nonstudents, although the possibility of a trend toward a higher proportion in students could not be excluded. History of depression did not differ between students and nonstudents in our study, nonetheless about half of students had a history of depression. The association between depression and suicidal ideation is well

Table 6. Factors Associated With a Longer Hospitalization (≥ 1 Week)[a]

Factor	Emergency Department	Hospitalized		Hospitalized Versus Emergency Department Odds Ratio (95% CI)	
		<7 d	≥7 d	<7 d	≥7 d
Total number of patients, n (%)	106 (57)	35 (19)	45 (24)		
Living status, n (%)					
Live with 1 or both parents	25 (24)	11 (31)	15 (33)	1 (reference)	1 (reference)
Live alone	21 (20)	13 (37)	16 (36)	1.25 (0.44–3.58)	1.20 (0.40, 3.59)
Live with roommate spouse or partner	60 (57)	11 (31)	14 (31)	0.34 (0.12–0.95)	0.52 (0.19, 1.43)
Attempt in past year, n (%)	17 (16)	9 (26)	16 (36)	2.30 (0.84–6.30)	5.44 (2.01, 14.71)
Method used, n (%)					
Collision/jump/fire burns/firearm/hanging	12 (11)	9 (26)	22 (49)	1 (reference)	1 (reference)
Laceration	22 (21)	4 (11)	7 (16)	0.30 (0.06–1.44)	0.08 (0.02–0.32)
Poisoning	55 (52)	18 (51)	9 (20)	0.58 (0.18–1.87)	0.06 (0.02–0.20)
Other	4 (4)	2 (6)	1 (2)	1.10 (0.13–9.30)	0.14 (0.01–1.75)
≥2 methods used	13 (12)	2 (6)	6 (13)	0.25 (0.04–1.55)	0.17 (0.05–0.65)

[a]One week was the median in-hospital stay among those hospitalized (Table 4). The model used multinomial logistic regression. All characteristics listed in Table 4 were tried for inclusion. Those significant at the .05 level were kept. "Student" was not a significant variable and was removed.

known.[34–38] However, less than 25% of young adults with a mental illness seek treatment.[4,10,26,31,39] Efforts to promote mental health literacy, which is associated with decreased stigma and increased help-seeking behavior, may help decrease the risk of suicide attempts in this population.

In our study, students were less likely to have a history of substance abuse and more likely to have family/social support than nonstudents. A lower risk of drug use disorder and nicotine dependence among college students compared to peers not attending college has been reported.[39] Students with no family/social support were found to be more likely to drop out of school and not enter college in some studies.[12,22,40,41] In addition, emotional, informational, and tangible social support was associated with less suicidal thoughts and behaviors among college students, while negative social exchanges were associated with increased suicidal thoughts and behaviors.[13] Friendship also has been found to play a role in suicidality in some ethnic groups, although this relationship remains poorly understood.[42]

Suicide attempt in the prior year was associated with suicide attempts that required hospitalization in our study. Although other studies did not assess the risk of suicide attempts requiring hospitalization versus those treated in the ED, many studies[9,43,44] reported a higher risk of reattempts among those with prior suicide attempts. Older age and living with 1 or both parents versus with a partner/roommate/spouse were also associated with suicide attempts requiring hospitalization in our study; these findings require further investigation in future studies.

Knowledge of specific factors associated with suicide attempts in young people can help inform and guide suicide prevention efforts in both academic and community settings. Specific to the findings of this study regarding the method of suicide attempt used, for example, limiting access to dangerous substances or large quantity of medications may help prevent or reduce suicide attempts in this population.

Our study has several strengths over previous studies. We used both medical records and ED triage files to identify suicide attempts. In Quebec, triage nurses are trained to recognize suicide cases at presentation, and an ED suicidal patient management protocol is in place in all hospitals. Patients presenting with signs of mental illness receive a comprehensive suicide evaluation and a detailed psychiatric evaluation that are recorded in the charts.[18] Moreover, missing data were minimal in our study, not exceeding 5% for most key variables. In addition, methods of data imputation were used to address this issue in the analyses. Therefore, we believe that our suicide identification method has captured most suicide attempts that presented to the ED of the study hospitals during the study period. The inclusion of all students who presented to the ED of the study hospitals for suicide attempts limited selection and reporting bias in our study in comparison to published studies[4,16,33] that have been based on surveys. Using our method of data collection, we were able to assess and compare these factors between students and nonstudents in a reliable way.

Our study also has some limitations. First, data obtained from hospital paper-based chart review may suffer from missing information; however, this was addressed previously and did not affect the final results. Second, the study was based on data from a convenience sample of 2 hospitals located in proximity to numerous universities and colleges. Although the proportion of students may be higher in our study hospitals, it is likely that characteristics of students and nonstudents do not differ greatly between these hospitals and the remaining hospitals in Quebec. Finally, this study is limited to young adults who sought help at the ED and excludes those in the community who do not seek help after a suicide attempt.

In conclusion, in this study, one third of all individuals aged 18 to 36 years who attempted suicide and were treated in 2 general hospitals in Montreal were postsecondary students. Over half of the students were not born in Canada, half were depressed at the time of the attempt, and one fifth were international. Compared to nonstudents, students were less likely to have a history of substance abuse and more likely to have family/social support. They were more likely to attempt suicide in the fall versus winter/spring semester and more likely to use poisoning and laceration compared to more violent methods (collision, jump, fire burns, firearm, hanging) of suicide.

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