A Socio-Ecological Perspective on Anxiety Among Canadian University Students
Une perspective socio-écologique sur l'anxiété chez les étudiants universitaires canadiens

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ABSTRACT

Little is known about how factors related to the post-secondary academic setting impact Canadian students' self-reported anxiety. Using a socio-ecological framework, we examined lifetime prevalence and correlates of self-reported student anxiety. Data were collected from 593 university students (422 of whom were undergraduates) from a university in central Canada through an online survey. Descriptive statistics and a series of regression models were used to examine the study's objectives. Most students reported having experienced anxiety that had impacted their lives. Findings provide support for a socio-ecological explanation of anxiety: socio-demographic, relationship, and academic factors predicted self-reported student anxiety. The results highlight the need to ensure that campus services and supports are well equipped to address the mental health problems of students. Theoretical, practice, and research implications are noted.

RÉSUMÉ

On sait peu de choses sur la façon dont les facteurs liés au milieu de l'éducation postsecondaire influencent le degré d'anxiété rapporté par les étudiants canadiens. Grâce à un cadre socio-écologique, nous avons examiné leur prévalence au cours de la vie et leurs corrélations avec l'anxiété rapportée par les étudiants. Les données furent recueillies par un sondage en ligne auprès de 593 étudiantes et étudiants universitaires (dont 422 de premier cycle) fréquentant une université du centre du Canada. Pour examiner les objectifs de l'étude, on a eu recours à des statistiques descriptives et à une série de modèles de régression. La plupart des étudiantes et étudiants ont

rapporté avoir vécu une anxiété qui a eu des répercussions sur leur vie. Les résultats vont dans le sens d'une explication socio-écologique de l'anxiété : des facteurs relatifs à la sociodémographie, aux relations et aux études semblaient en lien direct avec les degrés d'anxiété rapportés par les étudiantes et les étudiants. Les résultats mettent en lumière la nécessité de s'assurer que les services aux étudiants et les services d'aide sur les campus sont en mesure de prendre en charge les problèmes de santé mentale. On y souligne des implications sur le plan de la théorie, de la pratique et de la recherche.

Mental illness in university students is of growing concern. Evidence points to the high prevalence and burden of mental health problems in this segment of the population across North America (Gallagher, 2014; Storrie et al., 2010). In Canada, a 2016 survey of 43,780 students from 41 post-secondary institutions in the preceding 12 months revealed the following: (a) 64.5% of students felt overwhelming anxiety; (b) 44.4% reported feeling so depressed that it was difficult to function; (c) 8.7% reported cutting, burning, bruising, or injuring themselves intentionally; and (d) 13% reported considering suicide seriously (American College Health Association [ACHA], 2016). This is not surprising given that symptoms of mental health problems often surface first in childhood (Kieling et al., 2011) and, if left untreated, can persist into adulthood (Woodward & Fergusson, 2001).

The prevalence of overwhelming anxiety documented among university students is concerning. Left untreated, mental illness can impact academic performance (Lindsey et al., 2009), school completion rates (Eisenberg et al., 2009), students' overall health (Bayram & Bilgel, 2008), and other aspects of students' lives such as work productivity, social relationships, and quality of life (Bayram & Bilgel, 2008; Remes et al., 2016; Simpson et al., 2010). Untreated anxiety may also lead to pathological anxiety and mood disorders. As well, it can coexist with other mental and neurological disorders, chronic physical diseases, and problem behaviours such as substance use and abuse, problem gambling, and Internet addiction (Ho et al., 2014; Lorains et al., 2011; Marrie et al., 2015).

Research on university students has focused primarily on prevalence rates, comorbidity, and psychological or socio-demographic correlates of mental health (Blanco et al., 2008; Hunt & Eisenberg, 2010; Saïas et al., 2014). For instance, research has shown that within university student populations, anxiety varies across demographic and interpersonal factors. Students who identify as female (Hunt & Eisenberg, 2010; Misra & Mckean, 2000; Ran et al., 2016), who come from lower socio-economic backgrounds (Eisenberg et al., 2007; Hunt & Eisenberg, 2010; Weitzman, 2004), who experience financial struggles (Eisenberg et al., 2007; Ran et al., 2016), and who live away from parents (Blanco et al., 2008; Ran et al., 2016) may be at higher risk of screening positive for anxiety. Also, students who report low social support (Hefner & Eisenberg, 2009; Ran et al., 2016; Zhou et al., 2013), who are single (Chernomas & Shapiro, 2013), and who

experience relationship difficulties such as relationship breakups (Blanco et al., 2008) may be at higher risk of experiencing anxiety. However, these conclusions come predominantly from studies conducted in the United States with minimal work undertaken in this area in Canada.

Little is also known about how factors specific to the post-secondary setting (e.g., amount of school work, time management) affect student mental health (Saïas et al., 2014) and, more specifically, student anxiety. To our knowledge, few studies have assessed the impact of academic factors on mental health explicitly (Saïas et al., 2014; Vázquez et al., 2012). However, these studies examined correlates of psychological distress (defined as a state of poor mental health characterized by anxiety and depressive symptoms) and were conducted in Europe. Given the high proportion of Canadian post-secondary students who report experiencing overwhelming anxiety (ACHA, 2016) and the dearth of Canadian data on factors specific to the post-secondary setting that contribute to university student anxiety, a systematic examination of factors that could account for variation in student anxiety within the Canadian higher education context is worthwhile.

A socio-ecological model suggests that factors contributing to student mental health exist at multiple levels of students' social ecology: intrapersonal or individual level, interpersonal level, organizational level, community level, and public policy level (ACHA, 2020; McLeroy et al., 1988; Stokols, 1996). The socio-ecological perspective (a) emphasizes that health is affected by multiple factors, (b) highlights the dynamic interplay among factors within and between the various levels and their influential role on health, and (c) stresses the reciprocal relationship between individuals and their environments (Glanz et al., 2008).

Characteristics of the individual such as demographics and genetic heritage comprise the individual level, whereas interpersonal relationships (e.g., relationships with family members or friends; formal and informal social networks) are sources of influence at the interpersonal level (ACHA, 2020; McLeroy et al., 1988). At the organizational level, variables related to organizational settings (e.g., university, work) are viewed as influencing the health of individuals, whereas at the community level, structures to which individuals belong (e.g., family, places of worship, neighbourhoods) and relationships among these structures within a region are viewed as influential (ACHA 2020; McLeroy et al., 1988). Finally, legislation, regulations, and policies also affect health (ACHA, 2020; McLeroy et al., 1988). Studying the mental health of university students from a socio-ecological perspective offers a more comprehensive understanding of contributing factors and identifies opportunities to intervene at multiple levels.

Accordingly, we undertook a study that examined the correlates of self-reported student anxiety with a Canadian sample using the socio-ecological model as a guiding framework. Thus, student anxiety was conceptualized as being influenced by multiple factors at the individual, interpersonal, organizational, community, and policy levels. Given previous research findings on predictors of anxiety and

the dearth of research on the role of academic factors to self-reported student anxiety within the Canadian context, we focused on the contributing role of socio-demographic (individual), relationship (interpersonal), and academic (organizational) factors to student anxiety.

Methods

Participants

Participants were 593 students from a large university in central Canada (see Table 1). Criteria for participation included being a graduate student or an undergraduate student and being able to speak and understand English. Most participants who completed the survey identified as female (77.3%), heterosexual (89.2%), and single (72.8%). Slightly over half of those who completed the survey reported living with their parent, family member, or guardian (52.8%), and most were undergraduate students (80.2%) enrolled full time (90.4%).

Materials and Procedures

This study used a cross-sectional survey design. The survey was created using FluidSurveys, an online survey software platform. The research team created the survey questionnaire (included in this article as an appendix) and included questions relating to mental health problems experienced by students (e.g., anxiety), help-seeking behaviour, barriers to help-seeking, and hours spent on school studies, social activities, and work. The survey also included demographic questions (e.g., age, sex, sexual orientation), and these included an "other" option to allow students to provide additional information. The survey could take from 15 to 20 minutes to complete.

Data collection took place during three weeks in the middle of the fall academic term. Various strategies were used to encourage students to complete the online survey, including posters on campus, emails to campus listservs and student associations (with permission), and promotion on social media and networking sites. All undergraduate and graduate students ($n = 29,500$) received an email with the link to the online survey via an online student news service.

Despite this widespread distribution, the actual readership for this news service averages around 2,500 students. Within this context, achieving responses from nearly 600 students constitutes a response rate of about 24%. While somewhat low, this is consistent with other surveys conducted at our institution, such as the annual Canadian University Consortium survey, which attained a response rate of 23% in 2019 (Canadian University Survey Consortium, 2019).

Steps to ensure informed consent, anonymity, and confidentiality were taken throughout the data collection process. The first two pages of the survey (a) advised that the project had ethical approval from the university's research ethics board and institutional survey review committee, (b) provided information

Table 1

Distribution of Student Demographic Characteristics by Sample

Characteristics	Full Sample N = 593 n (%)	Undergraduates N = 422 n (%)
Age		
17–20	235 (42.7)	226 (54.2)
21–24	172 (31.3)	139 (33.3)
25–29	75 (13.6)	29 (7.0)
30+	68 (12.4)	23 (5.5)
Total	550 (100.0)	417 (100.0)
Gender		
Female	425 (77.3)	334 (80.3)
Male	125 (22.7)	82 (19.7)
Total	550 (100.0)	416 (100.0)
Sexual orientation		
Heterosexual	471 (89.2)	358 (84.8)
Other (Gay, Lesbian, Bisexual, Transgender, Two-Spirited, Queer, Questioning)	57 (10.8)	40 (9.5)
Gay	3 (0.5)	1 (0.2)
Lesbian	6 (1.1)	5 (1.2)
Bisexual	33 (5.9)	22 (5.2)
Transgender	2 (0.4)	2 (0.5)
Two-Spirited	1 (0.2)	1 (0.2)
Queer	4 (0.7)	2 (0.5)
Questioning	8 (1.4)	7 (1.7)
Total	528 (100.0)	398 (100.0)
Marital status		
Single	399 (72.8)	321 (77.2)
Married/Partnered	122 (22.3)	69 (16.6)
In a relationship/Engaged	26 (4.9)	26 (6.3)
In a relationship/Dating/In a long-distance relationship/In an open relationship	24 (5.7)	24 (5.7)
Engaged	2 (0.5)	2 (0.5)
Total	548 (100.0)	416 (100.0)

Characteristics	Full Sample	Undergraduates
	N = 593	*N* = 422
	n (%)	n (%)
Ethnic background		
Caucasian	336 (60.4)	256 (60.7)
Asian	101 (18.2)	78 (18.5)
Other than Caucasian/Asian and Multiple Ethnicities	119 (21.4)	88 (20.9)
Black	20 (3.6)	15 (3.6)
Latin American	10 (1.8)	6 (1.4)
Aboriginal	8 (1.4)	8 (1.9)
Arab	6 (1.1)	3 (0.7)
Combination—Caucasian and other categories	33 (5.9)	18 (4.3)
Combination—Aboriginal and other categories	19 (3.4)	18 (4.3)
Combination—Asian and other categories	11 (2.0)	11 (2.6)
Combination—Black and other categories	4 (0.7)	3 (0.7)
Other	8 (1.4)	6 (1.4)
Total	556 (100.0)	422 (100.0)
Current residence		
Parent/Family member/Guardian's house	290 (52.8)	258 (61.3)
Off campus—alone or with roommate	188 (34.2)	121 (28.7)
Off campus—with partner/spouse and/or children	44 (8.0)	20 (4.8)
On campus—residence, campus housing	27 (4.9)	22 (5.2)
Total	549 (100.0)	421 (100.0)
Year in school		
Undergraduate		
1st-year undergraduate	125 (23.8)	125 (29.6)
2nd-year undergraduate	92 (17.5)	92 (21.8)
3rd-year undergraduate	98 (18.6)	98 (23.2)
4th-year undergraduate and more	107 (20.3)	107 (25.4)

Characteristics	Full Sample N = 593 n (%)	Undergraduates N = 422 n (%)
Graduate/Professional		
Master's	58 (11.0)	0
PhD	35 (6.7)	0
Professional school	11 (2.1)	0
Total	526 (100.0)	422 (100.0)
Enrolment Status		
Full-time	489 (90.4)	382 (90.7)
Part-time	52 (9.6)	39 (9.3)
Total	541 (100.0)	421 (100.0)

regarding all elements of informed consent, and (c) provided a link to available resources on campus should students experience stress before or after completing the survey. Participants' email addresses were uploaded into the online survey software (FluidSurveys), and invitation emails were sent to participants directly from the online platform. The software assigned a code to the survey link sent to each participant and recorded only the assigned code with each person's responses.

Measures
Dependent Variable

Given that our study aimed to explore the differential cumulative effects of socio-demographic, relationship, and organizational factors on anxiety from a socio-ecological perspective, self-reported lifetime prevalence of anxiety was selected as the outcome measure. We chose to use this inclusive measure to avoid some of the limitations associated with standard questionnaire measures of anxiety, which tend to focus more on the current or recent state. While such point prevalence data can be helpful, we felt that lifetime prevalence rates would capture better the influence of diverse sources of anxiety our participants have accumulated over time, as also reflected by order of entry of sets of predictor variables in our data analysis (see below).

Independent Variables

The predictors examined in the present study were selected based on previous research and data availability. Age, gender, sexual orientation, and year in school were the socio-demographic variables chosen to represent the individual level of the socio-ecological model. The age variable measured age in years and

the remaining variables were dummy variables: gender (female/male), sexual orientation (heterosexual/other), and year in school (undergraduate/graduate).

Developing friendships, intimate relationships, relationships with parents/guardians, other relationships, and the lack of a support system were the relationship variables selected to represent the interpersonal level of the model. These variables were coded such that 1 indicated that survey respondents had selected this factor as affecting their mental health and 0 indicated the factor had not been selected as affecting their mental health.

Finally, fear of failure, time management, finances, speaking in class, career-related issues, work, working on academic group assignments, asking a professor or a classmate for help, and contacting a professor were the academic variables (related to the institutional setting) selected to represent the organizational level of the socio-ecological model. These variables were dummy variables wherein 1 indicated survey respondents had indicated the factor affected their mental health and 0 indicated survey respondents had not selected the factor as affecting their mental health.

Method of Data Analysis

All statistical analyses were conducted using SPSS, version 24. Objectives were examined through univariate descriptive statistics and a series of logistic regression models. Sets of predictor variables for each of the models were entered based on the socio-ecological model's levels of influence (ACHA, 2020; McLeroy et al., 1988; Stokols, 1996). In step 1, the socio-demographic (individual) variables of interest were entered. In step 2, the relationship (interpersonal) variables were added to the model, and in step 3, the academic (organizational) variables were added to the model. A regression model that included the significant predictors from the previous three models was also tested to examine how predictors performed when the variance accounted for by the non-significant predictors was removed. The multivariate analysis was conducted with the full sample and the undergraduate student sample. The graduate student sample was not used in light of the fact that bivariate analyses with this sample revealed a lack of variation within each of the predictors and non-significant associations between outcome and predictor variables. In the following sections, we report on the results for the full sample and for the undergraduate student sample.

<div align="center">

Results

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Univariate and Bivariate Analyses

The descriptive analyses of the outcome and predictor variables for the full sample, the undergraduate student sample, and the graduate student sample are presented in Tables 1 and 2. For a description of the socio-demographic predictors, see the participant section in Table 1. As can be seen in Table 2, over half

Table 2

Interpersonal and Academic Factors That Impact Mental Health by Student Sample

Characteristics	Full Sample N = 593 n (%)	Undergraduates N = 422 n (%)
Factors that impact mental health (select all that apply)		
Relationship (interpersonal factors)		
Developing friendships		
Selected	158 (26.6)	134 (31.8)
Not selected	435 (73.4)	288 (68.2)
Total	593 (100.0)	422 (100.0)
Intimate relationships		
Selected	156 (26.3)	131 (31.0)
Not selected	437 (73.7)	291 (69.0)
Total	593 (100.0)	422 (100.0)
Relationships with parents/guardians		
Selected	106 (17.9)	85 (20.1)
Not selected	487 (82.1)	337 (79.9)
Total	593 (100.0)	422 (100.0)
Lack of support system		
Selected	78 (13.2)	58 (13.7)
Not selected	515 (86.8)	364 (86.3)
Total	593 (100.0)	422 (100.0)
Other relationships		
Selected	67 (11.3)	57 (13.5)
Not selected	526 (88.7)	365 (86.5)
Total	593 (100.0)	422 (100.0)
Academic (organizational factors)		
Fear of failure		
Selected	381 (64.2)	310 (73.5)
Not selected	212 (35.8)	112 (26.5)
Total	593 (100.0)	422 (100.0)
Time management		
Selected	250 (42.2)	207 (49.1)
Not selected	343 (57.8)	215 (50.9)
Total	593 (100.0)	422 (100.0)

Characteristics		Full Sample N = 593 n (%)	Undergraduates N = 422 n (%)
Finances			
	Selected	219 (36.9)	174 (41.2)
	Not selected	374 (63.1)	248 (58.8)
	Total	593 (100.0)	422 (100.0)
Speaking in class (i.e., participating in discussion)			
	Selected	130 (21.9)	115 (27.3)
	Not selected	463 (78.1)	307 (72.7)
	Total	593 (100.0)	422 (100.0)
Career-related issues			
	Selected	110 (18.5)	81 (19.2)
	Not selected	483 (81.5)	341 (80.8)
	Total	593 (100.0)	422 (100.0)
Work			
	Selected	109 (18.4)	86 (20.4)
	Not selected	484 (81.6)	336 (79.6)
	Total	593 (100.0)	422 (100.0)
Working on academic group assignments with other students			
	Selected	106 (17.9)	94 (22.3)
	Not selected	487 (82.1)	328 (77.7)
	Total	593 (100.0)	422 (100.0)
Asking professor/classmate for help			
	Selected	80 (13.5)	68 (16.1)
	Not selected	513 (86.5)	354 (83.9)
	Total	593 (100.0)	422 (100.0)
Contacting professor			
	Selected	66 (11.1)	52 (12.3)
	Not selected	527 (88.9)	370 (87.7)
	Total	593 (100.0)	422 (100.0)
Ever experienced anxiety that has impacted your life			
Yes		345 (67.4)	262 (64.7)
No		167 (32.6)	143 (35.3)
Total		n=512	405 (100.0)

of the students across samples reported that a fear of failure affected their mental health and more than 60% of the students reported having experienced anxiety that had influenced their life.

The relationships between predictor variables and student anxiety for the undergraduate sample and the full sample were first examined with chi-square analyses. The chi-square analyses for the entire sample revealed that only the association between student anxiety and student age was not significant (X^2 = 7.529, p =.057). The chi-square analysis with the undergraduate student sample revealed that only the associations between student anxiety and student age (X^2 = 3.388, p =.336) and between student anxiety and time management (X^2 = 1.762, p =.111) were not significant.

Multivariate Analysis

Results of the logistic regression on student anxiety conducted with the full sample are presented in Table 3. All cases for which data were missing on any variable were excluded from the analysis. A three-step model was used to enter the variables to assess the contribution of each set of variables added to the model and to identify the model that accounted for the largest percentage of variance in student anxiety. As can be seen in Table 3, Model 3 (socio-demographic, relationship, and academic variables) was statistically significant (X^2 (18, N = 460) = 85.30, p <.05) and explained the greatest amount of variance (24%) when compared to the other models. Being an undergraduate student (OR = 0.41, p = .011) and indicating that developing friendships (OR = 1.87, p = .028), intimate relationships (OR = 1.84, p =.028), fear of failure (OR = 2.25, p = .002), or working on academic group assignments (OR = 1.94, p = .043) affected student mental health increased the likelihood of students reporting that they had experienced anxiety.

A model that included all significant predictors found in the previous three models was also tested to examine how each predictor performed when the variance accounted for by the non-significant predictors was removed. As this model only accounted for 19% of the variance in student anxiety, we report on Model 3 as this model accounted for the largest percentage of variance (24%) of all the models tested.

Results of the logistic regression on student anxiety conducted with the undergraduate student sample are presented in Table 4. Of all the models tested, Model 3 explained most of the variation in student anxiety (23%). Identifying as female (OR = 1.88, p = .032) and indicating that developing friendships (OR = 2.14, p = .011), fear of failure (OR =1.96, p = .015), or working on academic group assignments (OR = 2.11, p = .027) affected their mental health increased the likelihood of students reporting that they had experienced anxiety. A model that included all significant predictors found in the previous three models was also tested. As this model explained only 18% of the variance in student anxiety, we report on Model 3, which explained the largest amount of variance.

Table 3
Results of Logistic Regression on Student Anxiety With Full Sample (N = 460)

Predictors	B	SE B	OR	95% CI	p	VIF	R²
Step 1							
Model 1: Socio-demographic variables (individual factors)							
Age	.017	.020	1.017	[0.98, 1.06]	.395	1.336	
Gender	.654	.241	1.924	[1.20, 3.09]	.007	1.026	
Sexual orientation	1.092	.456	2.980	[1.22, 7.29]	.017	1.007	
Year in school (undergraduate/graduate)	-.688	.331	.503	[0.26, 0.96]	.038	1.362	
Constant	.328	.656	1.389		.617		
Likelihood ratio test (Nagelkerke)							.068
Step 2							
Model 2: Socio-demographic variables and relationship variables (individual and interpersonal factors)							
Age	.023	.021	1.023	[0.98, 1.07]	.272	1.366	
Gender	.614	.254	1.847	[1.12, 3.04]	.016	1.047	
Sexual orientation	.738	.475	2.092	[0.83, 5.30]	.120	1.058	
Year in school (undergraduate/graduate)	-.827	.340	.438	[0.23, 0.85]	.015	1.378	
Developing friendships	.786	.266	2.195	[1.30, 3.70]	.003	1.176	
Intimate relationships	.569	.266	1.767	[1.05, 2.97]	.032	1.226	
Relationship with parents/guardians	.636	.328	1.888	[0.99, 3.59]	.053	1.185	

Predictors	B	SE B	OR	95% CI	p	VIF	R²
Other relationships	.325	.382	1.383	[0.66, 2.92]	.395	1.115	
Lack of support system	.349	.366	1.417	[0.69, 2.90]	.340	1.169	
Constant	-.163	.668	.849		.807		
Likelihood ratio test (Nagelkerke)							.166
Step 3							
Model 3: Socio-demographic, relationship, and academic variables (individual, interpersonal, and organizational factors)							
Age	.034	.022	1.035	[0.99, 1.08]	.120	1.470	
Gender	.519	.271	1.681	[0.99, 2.86]	.056	1.086	
Sexual orientation	.642	.490	1.901	[0.73,4.96]	.190	1.076	
Year in school (undergraduate/graduate)	-.903	.354	.405	[0.20, 0.81]	.011	1.434	
Developing friendships	.625	.285	1.868	[1.07, 3.26]	.028	1.273	
Intimate relationships	.609	.277	1.838	[1.07, 3.16]	.028	1.247	
Relationship with parents/guardians	.559	.344	1.748	[0.89, 3.43]	.104	1.254	
Other relationships	.254	.396	1.289	[0.59, 2.80]	.521	1.156	
Lack of support system	.085	.383	1.089	[0.52, 2.31]	.824	1.198	
Fear of failure	.813	.257	2.254	[1.36, 3.73]	.002	1.192	
Time management	-.014	.233	.986	[0.63, 1.56]	.952	1.125	
Finances	-.217	.244	.805	[0.50, 1.30]	.373	1.214	
Speaking in class	-.114	.291	.893	[0.50, 1.58]	.696	1.296	
Career-related issues	.161	.311	1.175	[0.64, 2.16]	.604	1.117	

Predictors	B	SE B	OR	95% CI	p	VIF	R²
Work	-.116	.326	.890	[0.47, 1.69]	.721	1.279	
Working on academic group assignments	.660	.326	1.936	[1.02, 3.67]	.043	1.186	
Asking professor/classmate for help	.691	.470	1.996	[0.80, 5.02]	.141	1.556	
Contacting professor	.527	.492	1.693	[0.65, 4.44]	.284	1.462	
Constant	-.963	.731	.401		.211		
Likelihood ratio test (Nagelkerke)							.236

Note. CI = confidence interval for odds ratio (OR). VIF = variance inflation factor.

Table 4

Results of Logistic Regression on Anxiety of Undergraduate Students (N = 395)

Predictors	B	SE B	OR	95% CI	p	VIF	R²
Step 1							
Model 1: Socio-demographic variables (individual factors)							
Age	.017	.023	1.017	[0.97, 1.06]	.456	1.001	
Gender	.782	.258	2.186	[1.32, 3.63]	.002	1.001	
Constant	-.391	.540	.676		.469		
Likelihood ratio test (Nagelkerke)							.033
Step 2							
Model 2: Socio-demographic variables and relationship variables (individual and interpersonal factors)							
Age	.026	.023	1.026	[0.98, 1.07]	.265	1.012	
Gender	.704	.275	2.023	[1.18, 3.47]	.010	1.019	
Developing friendships	.916	.274	2.500	[1.46, 4.28]	.001	1.123	
Intimate relationships	.437	.276	1.548	[0.90, 2.66]	.114	1.218	
Relationship with parents/guardians	.737	.351	2.091	[1.05, 4.16]	.036	1.226	
Other relationships	.519	.416	1.681	[0.74, 3.80]	.211	1.143	
Lack of support system	.553	.415	1.739	[0.77, 3.93]	.183	1.186	
Constant	-1.130	.567	.323		.046		
Likelihood ratio test (Nagelkerke)							.169

Predictors	B	SE B	OR	95% CI	p	VIF	R^2
Step 3							
Model 3: Socio-demographic, relationship, and academic variables (individual, interpersonal, and organizational factors)							
Age	.033	.024	1.033	[0.99, 1.08]	.179	1.099	
Gender	.629	.293	1.875	[1.06, 3.33]	.032	1.070	
Developing friendships	.760	.298	2.137	[1.19, 3.83]	.011	1.254	
Intimate relationships	.451	.287	1.571	[0.89, 2.76]	.116	1.253	
Relationship with parents/guardians	.646	.366	1.907	[0.93, 3.91]	.078	1.289	
Other relationships	.448	.429	1.565	[0.68, 3.63]	.297	1.189	
Lack of support system	.247	.434	1.280	[0.55, 3.00]	.569	1.239	
Fear of failure	.670	.275	1.955	[1.14, 3.35]	.015	1.191	
Time management	-.210	.245	.810	[0.50, 1.31]	.391	1.150	
Finances	-.129	.256	.879	[0.53, 1.45]	.615	1.219	
Speaking in class	-.246	.307	.782	[0.43, 1.43]	.424	1.331	
Career-related issues	-.116	.329	.890	[0.47, 1.70]	.724	1.138	
Work	.200	.351	1.221	[0.61, 2.43]	.570	1.297	
Working on group assignments	.749	.338	2.114	[1.09, 4.10]	.027	1.193	
Asking professor/classmate for help	.713	.494	2.040	[0.78, 5.37]	.149	1.683	
Contacting professor	.398	.522	1.488	[0.54, 4.14]	.446	1.522	
Constant	-1.682	.642	.186		.009		
Likelihood ratio test (Nagelkerke)							.228

Note. CI = confidence interval for odds ratio (OR). VIF = variance inflation factor.

Discussion

To our knowledge, this is the first study to undertake a socio-ecological examination of anxiety among a sample of Canadian university students. Most students in this study (67.4% of the full sample, 64.7% of undergraduates) reported having experienced anxiety that had impacted their lives. This finding is consistent with the results of a recent survey of students from Canadian post-secondary institutions that revealed that students had experienced overwhelming levels of anxiety within the last 12 months (ACHA, 2016). This finding also corroborates results of studies that have documented anxiety among college students using validated measures (Bayram & Bilgel, 2008; Eisenberg et al., 2007; Ran et al., 2016). Our findings regarding the prevalence of anxiety are concerning and highlight the significance of the issue on campus and the need for campus services and supports that are well equipped to address the mental health problems of students.

Findings from the multivariate logistic regressions conducted with the full sample and the undergraduate student sample were similar. For both analyses, of all the models tested, Model 3, which included the socio-demographic, relationship, and academic variables, explained more of the variation in student anxiety than any of the subsets of predictors. This provides support for an inclusive socio-ecological explanation for anxiety.

Socio-Demographic Variables (Individual Factors)

In the analysis conducted with the full sample, undergraduate students were more likely than graduate students to report having experienced anxiety. This adds to the literature that has reached similar conclusions (Eisenberg et al., 2013) and is not surprising given research that has found higher anxiety rates for undergraduate students compared to graduate students (Eisenberg et al., 2007). It is possible that a lack of knowledge of available resources (Stewart et al., 2014), barriers to service utilization (Nunes et al., 2014), inhibited help-seeking (Beatie et al., 2016), or developmental or transition issues including academic, financial, and interpersonal stressors (Stewart et al., 2014) may put undergraduate students at greater risk of experiencing anxiety.

Student age did not affect the likelihood of student anxiety. This finding is consistent with the results of studies that have reached similar conclusions (Eisenberg et al., 2007). Insufficient variation within the student age variable (found in the bivariate analyses) may have made it difficult to detect a connection between this variable and student anxiety. Whether student age affects the likelihood of experiencing anxiety requires further investigation.

Similarly, gender and sexual orientation did not affect the likelihood of student anxiety. This finding is divergent from previous findings that students identifying as female (Eisenberg et al., 2007; Hunt & Eisenberg, 2010; Ran et al., 2016) and bisexual/gay/lesbian (Eisenberg et al., 2013) are at higher risk for anxiety

than male students or heterosexual students of any gender. Insufficient variation within the gender and sexual orientation variables may have made it difficult to detect a relationship between these variables and student anxiety.

In the analysis conducted with the undergraduate student sample, students identifying as female were twice as likely as students identifying as male to report having experienced anxiety. This adds to the literature that has reached similar conclusions (Eisenberg et al., 2007; Eisenberg et al., 2013; Wong et al., 2006). Whether the relationship between gender and student anxiety found in this study reflects a greater willingness of students identifying as female to share how they feel, is a causal relationship, or is a relationship mediated by other factors requires further investigation. Student age and sexual orientation did not affect the likelihood of student anxiety. Insufficient variation within these variables may have made it difficult to detect a significant relationship between these variables and student anxiety. The relationship between these variables requires further investigation.

Relationship Variables (Interpersonal Factors)

In the analyses conducted with the full sample and with the undergraduate student sample, students who indicated that developing friendships affected their mental health were twice as likely to report that they had experienced anxiety as students who did not indicate that developing friendships affected their mental health. In the analysis conducted with the full sample, students who indicated that intimate relationships affected their mental health were also twice as likely to report having experienced anxiety as students who did not indicate that intimate relationships affected their mental health.

To our knowledge, this is the first study to document that developing friendships and intimate relationships affects the likelihood of anxiety among university students. However, these findings support research that has found a link between social relationships and internalizing aspects of mental health, such as anxiety (La Greca & Harrison, 2005). Future research is needed to disentangle which aspects of developing friendships and intimate relationships (e.g., forming a relationship, negative interactions such as conflict or pressure) are associated explicitly with student anxiety.

Indicating that their relationship with parents/guardians and their other relationships affected student mental health did not increase the likelihood of students reporting that they had experienced anxiety. This is surprising given that relationships (quality and quantity) influence psychological health (Furman & Buhrmester, 1992; La Greca & Harrison, 2005; Uchino et al., 2004) and that relationship problems are one of the common presenting concerns in college counselling centres (Erdur-Baker et al., 2006). Indicating that a lack of a support system affected their mental health also did not increase the likelihood of students reporting that they had experienced anxiety. This finding is divergent

from research that has found that students who reported low social support are at greater risk of experiencing anxiety (Hefner & Eisenberg, 2009; Ran et al., 2016; Zhou et al., 2013). Insufficient variation within these variables (relationship with parents/guardians, other relationships, and a lack of support) may have made it difficult to detect a significant connection between these variables and student anxiety. Additional research is needed to ascertain whether these variables contribute to student anxiety.

In the analysis with the undergraduate student sample, intimate relationships, relationships with parents/guardians, other relationships, and a lack of a support system did not affect the likelihood of student anxiety. Insufficient variation within these variables may have made it difficult to detect a significant connection between these variables and student anxiety. The contribution of these variables to student anxiety cannot be ascertained without further investigation.

Academic Variables (Organizational Factors)

In the analyses conducted with the full sample and with the undergraduate student sample, students who reported that a fear of failure affected their mental health were twice as likely to report having experienced anxiety as students who did not indicate that a fear of failure affected their mental health. Students who indicated that working on academic group assignments affected their mental health were also twice as likely to report having experienced anxiety as students who did not indicate that working on academic group assignments affected their mental health. To our knowledge, this is the first study to examine and demonstrate these connections. These findings suggest that educating both course instructors and students about fear (e.g., fear of failure and of working on group assignments), its impact, and strategies for managing it would be beneficial (Bledsoe & Baskin, 2014).

In the analysis with the full sample, all other academic variables of interest (i.e., time management, finances, speaking in class, career-related issues, work, asking a professor or a classmate for help, contacting a professor) did not affect the likelihood of student anxiety. It is possible that insufficient variation within some of these variables made it difficult to find a significant connection between these variables and student anxiety. We are not aware of previous studies that have examined the predictive power of these specific variables. The lack of research on these variables and their lack of predictive power found in this study point to the need for additional research to understand better their connection to student anxiety.

In the analysis with the undergraduate student sample, all other academic variables included in the model (i.e., time management, finances, speaking in class, career-related issues, work, asking a professor or a classmate for help, contacting a professor) did not affect the likelihood of student anxiety. However, in the bivariate analysis, each of these variables was significantly associated with student

anxiety. It is possible that insufficient variation within some of these variables (e.g., speaking in class, career-related issues, work, asking a professor or a classmate for help, contacting a professor) made it difficult to find a significant connection between these variables and student anxiety in the multivariate analysis.

Implications for Counselling Practice

The findings from this socio-ecological analysis have practical implications for post-secondary institutions. Beyond noting the difficulties related to a fear of failure, to coping, and to relationship skills suggested by our findings, broader considerations are emerging from a socio-ecological perspective on sources of anxiety that post-secondary institutions ought to consider.

As noted by ACHA (2020), due to the dynamic interrelationships across different levels of factors, interventions are most likely to be effective when they address multiple levels of factors. While these systems-level interventions may not address student anxiety directly, they nevertheless foster a healthier campus environment that can contribute to enhanced functioning and resilience for a substantial proportion of students. For example, policy-level interventions could include such things as the development, implementation, and refreshing of campus mental health strategies, adoption of harm-reduction strategies for substance use, and targeted resources to address campus climate issues, including sexual violence, harassment, and discrimination. Along with these overarching interventions, community-level interventions such as active living programs can also be helpful to promote resilience and to mitigate anxiety, along with organizational interventions such as universal instructional design and flexible grading schemes to reduce academic anxiety.

The finding that over half of the students in this study reported having experienced anxiety shows the ubiquity of the problem as well as the need to embrace large-scale interventions at the institutional level as outlined above. Within such a health-promoting environment, normative and developmental anxiety would be less likely to interfere with the functioning of large numbers of students substantially.

However, given that individual and interpersonal factors were strong predictors of anxiety in this study, student services personnel would still be required to devote resources to addressing the challenges faced by vulnerable students, but such interventions should be targeted to those with the highest need (Cairns et al., 2009; Robinson et al., 2016). Some guidance on how to identify and respond to the level of student need can be gained from innovative stepped care approaches to mental health (e.g., Cornish et al., 2017) that are designed specifically to match services with needs as a way to enhance accessibility, service navigation, and resource allocation.

Implications for Research

Our study findings have important research implications. First, this study provides support for a socio-ecological explanation for student anxiety by highlighting the contributing role of intrapersonal (individual factors), interpersonal (relationship factors), and organizational (academic school setting) sources of influence. Second, study findings highlight the need for additional research on factors that contribute to student anxiety among Canadian university students, given that predictors examined in this study accounted for only 24% of the variance.

Limitations

Some limitations can be identified. First, the present study focused on lifetime prevalence and predictors of anxiety among a sample of university students. Given this focus, it was not possible to present a complete picture of the full range of mental health problems that may be experienced by students. Also, as our predictor set accounted for only about one quarter of the variance in anxiety, there are other factors not included in our study that contribute to students' experiences of anxiety. Second, biases inherent in self-reports such as social desirability bias (the over-reporting of desirable behaviour) and recall bias (accuracy or completeness of recollections) may have affected the findings. Third, as anyone who received the survey could participate, self-selection bias may have occurred. Also, most students in the sample were students who identified as female and who were between the ages of 17 and 24.

Further, the data came from a convenience sample obtained over a period of three weeks. Therefore, this sample was not necessarily representative of the student population at this university, and the interpretation of findings and generalizations should be made with caution. Finally, some survey questions were double-barrel questions (e.g., "Have you ever felt stressed or overwhelmed by all you have to do?"), which affects the interpretation and reliability of the data given that it is not possible to ascertain what respondents were rating (e.g., feeling stressed or overwhelmed).

Future Directions

Future research should make use of samples with increased participation of students who identify as male, who are older than 24 years, who are of Indigenous ancestry, who are international students, or who are enrolled in graduate programs. Also important is exploring the experience of anxiety in students who identify as transgender or non-binary. Research with such samples would contribute to the external validity of the findings. Future research should also examine the predictive power of additional characteristics from the various levels of students' social ecology (e.g., students' attitudes toward disclosing mental health issues, an individual level factor) and the impact of interactions between these levels on student anxiety. It would also be worthwhile to establish an ongoing, multi-campus,

Canadian university student mental health study to collect standardized data that would facilitate trend monitoring and building a national research base.

Conclusions

Our results indicate that anxiety is common among university students and that there are individual, interpersonal, and organizational factors that contribute to this experience. By employing a socio-ecological perspective, our study acknowledges the set of dynamic and interrelated factors that contribute to student anxiety and validates the importance of taking such an approach.

Based on our results, it appears that interventions best target the widespread experience of normative or developmental anxiety at the organizational and policy level intended to create a healthier campus climate. For students who are experiencing an overwhelming amount of anxiety, targeted interventions addressing their specific needs are recommended within a contemporary service delivery model matching student needs with the best available service.

A socio-ecological approach, such as we employed, is most likely to be effective because it provides a multifaceted view of the connections between factors related to mental health, learning, and systemic variables (ACHA, 2020) and as well as a broad perspective on the types of interventions that are most likely to be helpful for the largest number of students. By gathering information that will inform future work on this topic and evaluating the feasibility of our survey rollout strategy and questionnaire, we hope to have contributed to the understanding of student anxiety as well as ways in which post-secondary institutions can address this common concern most effectively.

Disclosure of Interest

The authors reported no potential conflict of interest.

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Appendix: University Anxiety Survey

1. Please indicate your age.
2. What is your gender?
   a. Male
   b. Female
   c. Transgender
   d. Ambiguous
   e. Prefer not to answer
3. What is your sexual orientation?
   a. Heterosexual
   b. Gay
   c. Lesbian
   d. Bisexual
   e. Two-spirited
   f. Queer
   g. Questioning
   h. Prefer not to answer
4. What is your marital status?
   a. Single

      b. Married/Partnered
      c. Separated
      d. Divorced
      e. Other

5. How do you usually describe your racial origins?
   a. Aboriginal
   b. White
   c. South Asian
   d. Chinese
   e. Black
   f. Filipino
   g. Latin America
   h. Arab
   i. Southeast Asian
   j. West Asian
   k. Korean
   l. Japanese
   m. Other

6. Where do you currently live?
   a. Campus residence hall
   b. Other campus housing
   c. Parent/guardian's house
   d. Alone
   e. With roommate(s)
   f. Other

7. What is your year in school?
   a. Year 1 undergraduate
   b. Year 2 undergraduate
   c. Year 3 undergraduate
   d. Year 4 undergraduate
   e. Year 5 or more undergraduate
   f. Graduate—Master's
   g. Graduate—PhD
   h. Graduate—professional school
   i. Post-doc
   j. Not seeking a degree
   k. Other

8. What is your enrolment status?
   a. Full-time
   b. Part-time
   c. Other

9. Are you an international student?
   a. Yes
   b. No
10. What program of study are you currently involved in? [A list of 101 degree programs followed.]
11. How many hours per week do you spend engaged in school studies?
    a. Less than 5 hours
    b. 5–15 hours
    c. 16–25 hours
    d. More than 25 hours
12. How many hours per week would you like to spend engaged in school studies?
    a. Less than 5 hours
    b. 5–15 hours
    c. 16–25 hours
    d. More than 25 hours
13. How many hours per week do you spend engaged in social activities?
    a. Less than 5 hours
    b. 5–15 hours
    c. 16–25 hours
    d. More than 25 hours
14. How many hours per week would you like to spend engaged in social activities?
    a. Less than 5 hours
    b. 5–15 hours
    c. 16–25 hours
    d. More than 25 hours
15. How many hours per week do you spend at work?
    a. Less than 5 hours
    b. 5–15 hours
    c. 16–25 hours
    d. More than 25 hours
16. How many hours per week would you like to spend at work?
    a. Less than 5 hours
    b. 5–15 hours
    c. 16–25 hours
    d. More than 25 hours
17. How would you rate your general health currently on a scale of 0 to 100?
18. How would you rate your general health prior to entering university on a scale of 0 to 100?
19. How would you rate your mental health currently on a scale of 0 to 100?

20. How would you rate your mental health prior to entering university on a scale of 0 to 100?
21. Have you ever felt overwhelmed by all you have to do?
    a. Yes
    b. No
22. Currently, how overwhelmed do you feel?
    a. Not at all overwhelmed
    b. Somewhat overwhelmed
    c. Average
    d. Overwhelmed
    e. Extremely overwhelmed
23. Have you ever experienced any of the following?
    a. Anxiety
    b. Depression
    c. Insomnia
    d. Eating disorders
    e. Obsessive-compulsive disorder
    f. Panic attacks
    g. Mood disorder
    h. Personality disorder
    i. Substance abuse or addiction
    j. Other mental health condition
24. Have you ever been diagnosed or treated for any of the following?
    a. Anxiety
    b. Depression
    c. Insomnia
    d. Eating disorders
    e. Obsessive-compulsive disorder
    f. Panic attacks
    g. Mood disorder
    h. Personality disorder
    i. Substance abuse or addiction
    j. Other mental health condition
25. Have you received information on the following topics from your university?
    a. Depression
    b. Anxiety
    c. Eating disorders
    d. Grief and loss
    e. Sleep difficulties
    f. Stress reduction
    g. Suicide prevention

     h.   How to help others in distress
     i.   Problem use of Internet/computer games

26. Are you interested in receiving information on the following topics from your university?
     a.   Depression
     b.   Anxiety
     c.   Eating disorders
     d.   Grief and loss
     e.   Sleep difficulties
     f.   Stress reduction
     g.   Suicide prevention
     h.   How to help others in distress
     i.   Problem use of Internet/computer games

27. Have you ever seriously considered suicide?
     a.   Yes
     b.   No

28. Have you ever attempted suicide?
     a.   Yes
     b.   No

29. Have you ever experienced anxiety that has impacted your life?
     a.   Yes
     b.   No

30. Have you ever been prescribed medications intended to treat a mental health issue?
     a.   Yes
     b.   No

31. During the past 12 months, did you feel that anyone held negative opinions about you or treated you unfairly because of your mental health?
     a.   Yes
     b.   No
     c.   Not applicable

32. Which of the following most impacts your mental health? (Select all that apply.)
     a.   Amount of school work
     b.   Achieving good/competitive grades
     c.   Fear of failure
     d.   Selecting courses
     e.   Writing exams
     f.   Taking notes in lectures
     g.   Studying for exams
     h.   Disclosing mental health issue to students/professor
     i.   Working on academic group assignments with other students

     j.   Asking professor/classmate for help
     k. Contacting professor
     l.   Giving oral presentations in class
     m. Speaking in class (e.g., participating in discussions)
     n. Remembering information for test and exams
     o. Developing friendships
     p. Standing in line
     q. Time management
     r.   Body image
     s.   Lack of confidence
     t.   Abuse or neglect
     u. Bullying
     v.   Relationship with parents/guardians
     w. Intimate relationships
     x.   Other relationships
     y.   Lack of support system
     z.   Sleep difficulties
     aa. Finances
     ab. Children
     ac. Work
     ad. Career-related issue
     ae. Not applicable
     af. Other

33. Within the past 12 months, have any of the following affected your academic performance?
     a. Anxiety
     b. Concern for a troubled friend or family member
     c. Depression
     d. Death of a friend or a family member
     e. Drug use
     f.   Alcohol use
     g. Sleep difficulties
     h. Housing
     i.   Stress
     j.   Low self-esteem
     k. Hopelessness
     l.   Frustration
     m. Management of stress
     n. Management of mental health condition
     o. Handling crises
     p. Problems with concentration
     q. Other

34. Within the last 6 months, how many days did you use the following?
    a. Tobacco (cigarettes, chewing tobacco, cigars)
    b. Alcohol
    c. Marijuana (pot, weed, hashish, hash oil)
    d. Cocaine (crack, rock, freebase)
    e. Methamphetamine (crystal meth, ice, crank)
    f. Other amphetamines (diet pills, bennies)
    g. Sedatives (downers, ludes)
    h. Hallucinogens (LSD, PCP)
    i. Opiates (heroin, smack)
    j. Inhalants (glue, solvents, gas)
    k. MDMA (Ecstasy)
    l. Other club drugs (GHB, ketamine, Rohypnol)
    m. Other illegal drugs
    n. Other

35. During the past month, how often have you felt happy?
    a. Never
    b. Less than 5 days
    c. Between 5–15 days
    d. More than 15 days
    e. Every day

36. Have you ever received psychological or mental health services or support from any of the following? (Select all that apply.)
    a. Counsellor/therapist
    b. Psychologist
    c. Psychiatrist
    d. Other professional (i.e., physician, nurse, nurse practitioner, occupational therapist)
    e. Minister/priest/rabbi/other clergy
    f. Support groups
    g. Web-based supports
    h. Not applicable

37. Have you ever accessed any of the following services from your university? (Select all that apply.)
    a. Student Counselling Centre
    b. Student Counselling Centre website and online resources
    c. Groups/workshops (career planning, Mastery of Your Anxiety and Worry, Managing Your Mood, Managing Negative Emotions and Stress, and others)
    d. STATIS program (Student Threat Assessment Triage Intervention Support)
    e. Student Accessibility Services

      f.   Peers: Students Helping Students

      g.   Aboriginal Students Centre

      h.   Other

      i.   Not applicable

38. If you selected any of the options in question 37, how satisfied were you with the help you received through the university services?

      a.   Extremely dissatisfied

      b.   Dissatisfied

      c.   Somewhat dissatisfied

      d.   Neutral

      e.   Somewhat satisfied

      f.   Satisfied

      g.   Extremely satisfied

39. Have you ever had a problem accessing the services and supports listed in the previous two questions?

      a.   Yes

      b.   No

      c.   Not Applicable

40. If you answered yes to question 39, what are the most common factors that inhibit you from accessing the services and supports listed above?

      a.   Social anxiety

      b.   Not knowing where to go

      c.   Procrastination

      d.   Feeling uncomfortable

      e.   Feeling judged

      f.   Stigma from others

      g.   Self-stigma

      h.   Finances/Cost

      i.   Other

41. If, in the future, you were having a personal problem that was bothering you, would you consider seeking help from a mental health professional?

      a.   Yes

      b.   No

42. Would you know where to go for help?

      a.   Yes

      b.   No

43. What would help you to access services or supports?

44. Which of the following services related to mental health would you most like to see available on campus that will help your mental health?

      a.   An online forum to discuss mental health issues, supervised by counselling professionals

      b.   Hotline service

    c.   Peer mentorship programs within each faculty
    d.   Skills for management of holistic health in first-year courses
    e.   Peer discussion groups moderated by trained student facilitators
    f.   Sleep assessment and consultation
    g.   Pair students with alumni
    h.   Pair new students with faculty and staff members
    i.   Workshops where volunteers share their experience with mental illness
    j.   Co-op placements for students in community mental health organizations
    k.   Financial advice from graduate students
    l.   Free exercise classes during mid-terms and exams
    m. Students who identify as overwhelmed paired with a psychology graduate for support
    n.   Availability of fresh, moderately priced foods
    o.   Other

45. What do your teachers need to know about student mental health?
46. What does the president of the university need to know about student mental health?
47. What do students need to know about student mental health?
48. If you could have three wishes relating to changes that the university could make that would improve your mental health, what would they be?

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