

APPENDIX: REVIEW PROTOCOL

Background

Student wellbeing is influenced by several socioecological levels of influence (Allen et al., 2016). These factors, such as family relationships, campus environment, culture, and policies can hinder or promote wellbeing (Allen et al., 2016). Settings-based approaches to health promotion were introduced in the 1986 Ottawa Charter for Health Promotion, which urges individual-based interventions to be considered alongside population-based (i.e., structural and organizational) strategies to promote student mental health (Fernandez et al., 2016). Mental health interventions that are multipronged may offer more benefits (Weare & Nind, 2011, Arango et al., 2018). However, the mental health landscape has traditionally been treatment-focused and individual-focused rather than emphasizing upstream, preventive approaches that also consider campuses and student populations.

The Okanagan Charter is an international document resulting from collaboration between 45 countries at the 2015 International Conference on Health Promoting Universities and Colleges. It reflects a global desire to confront increasingly complex issues related to health, wellbeing, and sustainability of people and the planet, putting post-secondary institutions at the forefront of the movement — encouraging national education and related organizations to mobilize to create healthier campuses and communities.

Several models have resulted to address needs for the development of health promoting colleges one of which, adopted by the University of Guelph, is the Healthy Campuses Model. Healthy Campuses Model is a tool developed by the Canadian Mental Health Association and the Canadian Association of College and University Student Services (CACUSS). The tool provides a conceptual framework for post-secondary student mental health, dividing the student population into three groups with corresponding strategies to address their needs. The framework considers the following levels: (1) institutional structure, (2) supportive, inclusive campus climate and environment, (3) mental health awareness, (4) community capacity to respond to early indicators, (5) self-management competencies and coping skills, (6) accessible mental health services, and (7) crisis management.

Further, in 2021 the Mental Health Commission of Canada defined National Standards for Mental Health and Wellbeing for Post-Secondary Students, which provides a set of adaptable guidelines for post-secondary institutions based on their resources and community context to set priorities for improving student mental health and wellbeing. These standards align well with the commitments of the Okanagan Charter.

Many postsecondary campuses across Canada adopt this health campus perspective. However, Canadian postsecondary students seem to show increasing prevalence of mental health concerns, including stress, psychological distress, mental illness diagnoses, and help-seeking for mental health concerns (Linden et al., 2021). Further, female students tend to show higher levels of concerns than their male counterparts. Since 2018, research by the MHCC and CACUSS found a significant increase (29%) in anxiety symptoms (Rashid and Genova 2022). This has been exacerbated by the COVID-19 pandemic. Concerns presented by students in 2020-2021

during the COVID-19 pandemic included: pandemic fatigue (87%), anxiety not directly related to the pandemic (84%), social isolation (83%), lack of in-person connections with peers (77%), online learning fatigue (77%), motivation (70%), and financial distress (64%) (Rashid and Genova 2022). These findings suggest that current strategies may need to be revisited.

An international scoping review of stress and mental wellbeing in post-secondary institutions found that students had overall poor levels of mental health functioning, high levels of stress, and poorer emotional health when compared to the general population. Some common sources of student stress included (1) challenges adjusting to post-secondary lifestyle (changing relationships with parents, unhealthy behaviours related to sleep, physical activity, and nutrition, and reduced sense of academic control), (2) increased academic demands, (3) social integration and belonging to campus culture, as well as experiences of racism, sexism, and violence, (4) academic and professional concerns for the future, (5) financial strain, and (6) relationships (loss of connection with childhood friends, difficulty navigating cohabitation, and romantic partners).

In Canada poor mental health functioning is captured according to National College Health Association (NCHA) data. Nearly 15% of students reported tremendous stress levels and 46.2% reported stress above average (Linden et al 2018). The most diagnosed mental illnesses in Canadian post-secondary students were anxiety (18.4%) and depression (14.7%). Just over one fifth of students (20.4%) had received a professional diagnosis of depression at some point in their lifetime.

Consistent with international literature, academic stressors were the most commonly identified source of stress (58%) among Canadian post-secondary students in addition to concerns about safety on campus. For instance, students report pressures to engage in substance use, sexual harassment and assault, and physical/emotional abuse or assault. Males more often report physical abuse and females more often report sexual or emotional abuse.

The Canadian NCHA data also reveal prevalence estimates of past 12-month self-injury in Canadian post-secondary students to be 8.7% and serious consideration of suicide 13%. Data from the United States (estimating prevalence of self-injury in post-secondary students to range between 3 and 7%) note different triggers by gender. Males more often report academic competition, financial strain and workload to thoughts of suicide and self-injury while females more often attribute heartbreak, family pressure, and pre-existing mental illness.

A national scoping review also highlighted unique mental health experiences of subpopulations including military service members, medical students, ethnic minorities, Indigenous students, and international students. The literature suggests these students experience additional stress associated with cultural differences and stigmatization that make adjustment to post-secondary life difficult. (e.g., LGBTQ+ students often cannot find mental health services that meet their needs and professional students face excessive stigma with both experiencing a mental illness and help-seeking). Males and online students have also been identified as at risk as males rarely seek help for mental health or substance use difficulties and online students lack access to services on-campus (Linden et al 2018).

There has been considerable discussion of factors that contribute to student resilience, including intrapersonal factors (like self-efficacy, optimism, locus of control, the use of positive vs. Negative coping mechanisms) as well as external factors like the importance of a social support network and help-seeking behaviours. Students reporting a strong social support network at home and at school tend to fare better academically than those without. Negative coping mechanisms like avoidance, withdrawal, or denial (often marked by substance use among students) are linked to worse adjustment and negative mental health outcomes. Some literature documents associations between self-efficacy, locus of control, tenacity, optimism and positive acceptance of change with resilience against stressors and cope through periods of change. Negative relationships with parents or harmful early childhood experiences have been linked to poorer adjustment and poorer resilience in students (Linden et al 2018).

Barriers to help-seeking in Canadian post-secondary students have been identified as concerns about confidentiality, lack of time, not believing the problem warranted professional help, uncertainty that professional help would be beneficial, and preferring other forms of support (friends, family, intimate partner etc.) (Linden et al 2018)

Thus, there is a need to better understand the factors affecting mental health among Canadian postsecondary students to tackle existing risk factors and amplify protective factors to create campus settings that promote flourishing mental health among this priority group. A scoping review of the literature is proposed to use standardized methods to identify, characterize, and synthesize all available studies examining associations of risk and protective factors influencing postsecondary students' mental health. Results from this review will help to inform future interventions for college and university campuses aimed at promoting positive mental health.

Methods

Review approach, question, and eligibility criteria. This research will be conducted and reported using standard scoping review methodology, which uses structured, transparent, and robust procedures to identify, assess, and synthesize all available evidence on a topic (Arksey & O'Malley, 2005; Tricco et al., 2018). The review question is: “What are risk and protective factors associated with mental health among Canadian postsecondary students attending colleges and universities?”

Table S3. Eligibility criteria for the scoping review under consideration.

Category	Inclusion criteria	Exclusion criteria
Population	Postsecondary students attending a college or university in Canada	Campus employees
Exposure	Research on mental health Research on risk (e.g., academic stress, substance use, hopelessness) and protective factors (e.g., sense of community, social support, age)	COVID-19-related measures as a predictor

Intervention	N/A	N/A
Comparator	N/A	N/A
Outcome	Research on risk (e.g., academic stress, substance use, hopelessness) and protective factors (e.g., sense of community, social support, age) related to mental health or wellbeing outcomes	
Study type	Eligible sources of evidence will include journal articles as well as any other research documents (e.g., research reports, dissertations and theses, and conference proceedings). Observational study designs (i.e., cross-sectional, cohort, case-control)	Commentaries, perspectives, editorials, and review articles Experimental study designs (e.g., quasi-experimental, randomized controlled trial, natural experiments), program evaluations, and qualitative studies
Language	English or French	
Years	Published in the last 10 years (i.e., 2013-present)	

Search strategy. A comprehensive search strategy will be developed using a combination of pre-tested search terms implemented in the following bibliographic databases: Scopus, PubMed, PsycINFO, Web of Science, EMBASE, and ProQuest Dissertations and Theses. The proposed search algorithm is shown below:

Table S4. Scoping review search strategy.

Category	Terms ^a
Population	student*
Setting	(campus* OR universit* OR colleg* OR “post-secondary” OR "post secondary" OR postsecondary OR “higher education” OR undergrad*)
Outcomes	(depressi* OR anxiety OR stress OR suicid* OR distress OR hopelessness OR "self-harm" OR "self harm" OR "self injury" OR "self-injurious" OR resilien* OR panic* OR flourish* OR languish* OR hedoni* OR eudaemoni* OR eudemoni* OR thrive* OR dyshtymi* OR “bipolar disorder” OR cyclothymi* OR psychosis OR schizo* OR psychopath* OR “personality disorder” OR “obsessive compulsive disorder” OR OCD OR “eating disorder” OR anorexi* OR bulimi* OR dysmorphi* OR PTSD) OR ((health OR well-being OR “well being” OR wellbeing OR illness* OR disorder* OR problem*) AND (mental OR emotional OR psych*))

^a Each category of terms will be combined using the AND operator. This combination of terms will be determined from pre-testing in PubMed. Number of hits in PubMed (Feb 01, 2023) = 274

A complementary search for grey literature documents (e.g., conference proceedings and research reports) will be conducted in Google. A search verification strategy will also be employed to ensure that no relevant articles are missed, which will include handsearching the reference lists of a selection of relevant articles and previously conducted literature reviews on the topic.

Relevance screening and confirmation. The titles and abstracts of citations identified during the search will be assessed for their relevance using a structured screening form. Full

articles of relevant references will be obtained, they will be confirmed for relevance, and key characteristics will be extracted using another structured form. This data charting form will capture study characteristics such as: publication type and year; study methods and context (e.g., design, data collection methods and tools); and details on the student populations (e.g., sociodemographic), and outcomes (e.g., risk and protective factors) investigated. Article characteristics from this stage will be summarized descriptively, charted, and potentially used to prioritize and/or refine the specific inclusion criteria for the follow-up steps.

Risk-of-bias assessment and data extraction. Relevant studies with extractable outcome data and that meet all eligibility criteria may undergo a risk of bias assessment. A tool will be developed using assessment criteria modified and adapted from previously developed risk-of-bias instruments for both observational and experimental studies. Detailed quantitative data on factors associated with key outcomes will be extracted using a data extraction form.

Review management. To ensure rigour in the review process, all steps will be conducted using pre-tested tools by two independent reviewers. All references identified in the review will be deduplicated in the reference management program Mendeley (Elsevier Inc., New York, United States). Relevant screening, confirmation, and data extraction will be conducted using Microsoft Excel (Microsoft, Redmond, Washington, United States).

Data analysis. Extracted data from relevant articles will be descriptively characterized and summarized. Risk and protective factors may be synthesized to determine pooled effects across studies.

References

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- Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology*, 8(1), 19-32. <https://doi.org/10.1080/1364557032000119616>
- Fernandez, A., Howse, E., Rubio-Valera, M., Thorncraft, K., Noone, J., Luu, X., ... & Salvador-Carulla, L. (2016). Setting-based interventions to promote mental health at the university: A systematic review. *International Journal of Public Health*, 61, 797-807. <https://doi.org/10.1007/s00038-016-0846-4>
- Küttel, A., & Larsen, C. H. (2020). Risk and protective factors for mental health in elite athletes: A scoping review. *International Review of Sport and Exercise Psychology*, 13(1), 231-265. <https://doi.org/10.1080/1750984X.2019.1689574>
- Linden B, Boyes R, and Stuart H. (2021). Cross-sectional trend analysis of the NCHA II survey data on Canadian post-secondary student mental health and wellbeing from 2013 to 2019. *BMC Public Health* 21. 590 (2021). <https://doi.org/10.1186/s12889-021-10622-1>
- Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., ... & Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine*, 169(7), 467-473. <https://doi.org/10.7326/M18-0850>

APPENDIX: RELEVANCE SCREENING FORM

Question	Options	Additional notes
Does the citation describe primary research that investigates <u>risk or protective factors</u> associated with <u>mental health outcomes</u> among <u>postsecondary students</u> in Canada?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<p>Risk and protective factors:</p> <ul style="list-style-type: none"> Factors identified by the investigator or the respondents and can be at the individual, interpersonal, environmental, cultural, and policy levels. Exclude any articles that are investigating relationships between one mental health outcome and another (e.g., depression on NSSI). <p>Mental health outcomes:</p> <ul style="list-style-type: none"> Positive and negative self-reported or diagnosed outcomes. <p>Students:</p> <ul style="list-style-type: none"> Postsecondary students of any age and status. Exclude any studies investigating mental health among alumni. Exclude studies investigating other groups (e.g., children, adolescents) in addition to postsecondary students. <p>Include:</p> <ul style="list-style-type: none"> Primary research designs based out of Canada. Articles in English or French. Only include descriptive studies if they measure some effect or association in mental health outcomes (e.g., mean difference, correlation coefficients, odds ratio). <p>Exclude:</p> <ul style="list-style-type: none"> Studies that are focused on other health behaviours and do not assess mental health as an outcome (e.g., physiological, physical, help-seeking behaviours). Forecasting/simulation studies. Studies in clinical/hospital settings, lab settings, and practicum settings. Experimental study designs, qualitative studies, most pilot studies, and program evaluations. Effectiveness of interventions. Tool development and validation studies Articles that focus on a genetic component (vs. sociodemographic and modifiable factors). Articles with exposures related to personality traits.

APPENDIX: DATA CHARACTERIZATION FORM

Question	Options	Additional notes
Does the citation describe primary research that investigates <i>campus and environmental factors</i> associated with <i>mental health outcomes</i> among <i>postsecondary students</i> in Canada?	<input type="checkbox"/> Yes, observational study design <input type="checkbox"/> No, specify reason for exclusion: <input type="checkbox"/> Qualitative study <input type="checkbox"/> Experimental design <input type="checkbox"/> No relevant data for synthesis <input type="checkbox"/> Not relevant to review question <input type="checkbox"/> Other language <input type="checkbox"/> Not primary research <input type="checkbox"/> Other: _____	<p>Students: Postsecondary students of any age, who are on-campus or distance education students. Exclude any studies investigating mental health among alumni, non-higher education student groups, and aggregated data from students and other non-students (e.g., family members, stakeholders, staff).</p> <p>Risk and protective factors: Factors identified by the investigator or the respondents and must include environmental or campus-related variables with a focus on postsecondary settings.</p> <p>Mental health outcomes: Positive and negative self-reported or diagnosed outcomes.</p> <p>Observational studies: Aimed at establishing associations, correlations, magnitude of difference between exposure and outcome.</p>
What is the publication year of this article?	<input type="checkbox"/> _____	
What type of document is this article?	<input type="checkbox"/> Journal article <input type="checkbox"/> Thesis <input type="checkbox"/> Conference abstract <input type="checkbox"/> Other, please specify: _____	
What is the article language?	<input type="checkbox"/> English <input type="checkbox"/> French	Exclude studies in languages other than English or French
Where was the study conducted?	<input type="checkbox"/> National <input type="checkbox"/> Alberta <input type="checkbox"/> British Columbia <input type="checkbox"/> Manitoba <input type="checkbox"/> New Brunswick	Exclude studies outside of Canada and if other countries are included in the investigation. Please select all that apply.

	<input type="checkbox"/> Newfoundland and Labrador <input type="checkbox"/> Northwest Territories <input type="checkbox"/> Nova Scotia <input type="checkbox"/> Nunavut <input type="checkbox"/> Ontario <input type="checkbox"/> Prince Edward Island <input type="checkbox"/> Quebec <input type="checkbox"/> Saskatchewan <input type="checkbox"/> Yukon	
When was the study conducted?	<input type="checkbox"/> _____ <input type="checkbox"/> Not reported	Enter YYYY - YYYY
What is the study design?	<input type="checkbox"/> Cross-sectional <input type="checkbox"/> Longitudinal, specify number of occasions data were collected: _____ <input type="checkbox"/> Other: _____	
Was the study informed through a framework or theory?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Examples include but are not limited to socioecological model, Health Belief Model, Health Campuses Model, Self-Determination Theory, Social Cognitive Theory, Stages of Change - Transtheoretical Model, Keyes Dual-Continuum Model of Mental Health and Wellbeing, Standard for Psychological Health and Safety of Post-Secondary Students, Transactional Model of Stress/Coping, the Job Demand-Resource Model of Burnout.
Were there any reported methods used to inform instrument development?	<input type="checkbox"/> Yes <input type="checkbox"/> No	For example, previous surveys/research, interviews, focus groups, expert panel, and informal discussions.
Were data collection instruments pre-tested?	<input type="checkbox"/> Yes <input type="checkbox"/> Not reported	Examples include pilot study, interviews, and expert review.
What was mode of conduct?	<input type="checkbox"/> In-person <input type="checkbox"/> Telephone <input type="checkbox"/> Web-based	

	<input type="checkbox"/> Postal <input type="checkbox"/> Other: _____ <input type="checkbox"/> Not specified	
Were participants recruitment methods clearly reported?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Examples include survey research panel, public database, social media, public places, etc.
Did the study focus on a particular educational program or level?	<input type="checkbox"/> _____ <input type="checkbox"/> No	Examples can include undergraduate students, undergraduate students specific to a program, graduate/doctoral students, and professional program students (e.g., nursing, medical, law).
Did the study focus on a particular equity-seeking group?	<input type="checkbox"/> _____ <input type="checkbox"/> No	Examples include Indigenous students, students belonging to a specific ethnocultural group (e.g., Chinese), student athletes, international students, and mature students.
What was the age range of the study population?	<input type="checkbox"/> _____ <input type="checkbox"/> Not reported	YY – YY years
What was the mean age of the study population?	<input type="checkbox"/> _____ <input type="checkbox"/> Not reported	YY years (<i>do not include decimal places</i>) If the study only reports medians, please report it and indicate it is the median in the response.
Was the study response rate reported?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
What was the final sample size?	<input type="checkbox"/> _____ <input type="checkbox"/> Not reported	Report final sample size used for analysis.
Additional comments:	<input type="checkbox"/> _____	

APPENDIX: DATA CHARTING FORM

Question	Options	Additional notes
What was the objective of the study?	<input type="checkbox"/> _____	Keep this as concise as possible (i.e., 1-2 sentences).
What exposures were measured?	<input type="checkbox"/> Individual <input type="checkbox"/> Interpersonal <input type="checkbox"/> Institutional or community <input type="checkbox"/> Environmental <input type="checkbox"/> Policy	
What outcome categories were measured?	<input type="checkbox"/> Negative mental health <input type="checkbox"/> Positive mental health <input type="checkbox"/> Both	
What were the main findings?	<input type="checkbox"/> _____	Only limit findings to the review question and keep this concise.
Additional comments:	<input type="checkbox"/> _____	

Note: Study design, sample size, and details on study population will be ported over to the summary table here. If outcomes can be synthesized, they will be extracted via an additional, separate data extraction form.