

Understanding the Mental Health of Canadian Physician Assistant Students

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Abstract

The mental health of medical students has been well studied, revealing significant rates of anxiety, depression, and burnout. Despite the similarities in training, limited research has been done to understand the mental health of Physician Assistant (PA) students. This study investigates the mental health of first- and second-year PA students across Canadian training programs. Eligible students at the three Canadian PA programs received a recruitment email providing a link to a confidential survey hosted on REDCap. Participants provided non-identifying demographic information and completed the Patient Health Questionnaire (PHQ-9), Generalized Anxiety Disorder Screener (GAD-7), and the Maslach Burnout Inventory General Student version (MBI-GS(S)). Additional questions covered previous mental health history and coping styles. Seventy-three students completed the survey (response rate of 43.4%). One-third had seen a health professional in the past 12 months for mental health. Depression, anxiety, and burnout symptoms were prevalent. GAD-7 varied significantly between schools (higher at University of Manitoba vs McMaster University), and marginally between academic year (higher in first years). Positive correlations were found among PHQ-9, GAD-7, and burnout subscales. Maladaptive coping mechanisms were associated with higher anxiety, depression, and burnout, while adaptive coping positively correlated with PE burnout subscale. No significant differences in PHQ-9 or MBI-GS(S) were found between academic years or programs. As the PA profession continues to expand in Canada, understanding the prevalence of anxiety, depression and burnout is crucial. Improving PA student mental health should be a priority for education programs to promote a healthy workforce and develop a foundation for further research.

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1. Introduction

1.1 Physician Assistants as Medical Practitioners

Physician assistants (PAs) are highly skilled, medically trained practitioners who serve as integral members of the healthcare team (1). PAs are trained as generalists and work within multiple medical specialties to extend the services of physicians whom they work in collaboration with. As an overview, PAs collect detailed patient histories, perform physical examinations, order and interpret investigations, perform diagnostic and therapeutic procedures, develop and implement comprehensive treatment plans, prescribe medications and provide patient education (1). The PA profession is well established in the United States, dating back to the 1960's when the PA role emerged from the utilization of skilled military medics (2). PAs have continued to make a positive impact within Canadian healthcare since their initial recognition in 1984 when the Canadian Armed Forces adopted the term 'Physician Assistant' for senior medics, leading to the first formally trained Canadian PAs. Canadian military-trained PAs eventually branched into the public health sector, gaining recognition as civilian PAs, leading to the development of Canadian civilian PA training programs in the early 2000's (2). As of 2023, there were estimated to be ~1000 certified PAs working across nine provinces in Canada, although the true number is likely greater given the distribution of recent graduates from the three Canadian PA programs; McMaster University's Physician Assistant Education Program, University of Toronto's Consortium of PA Education and University of Manitoba's Master of Physician Assistant Studies (2).

All Canadian PA education programs are 24-26 months in duration and deliver an academically challenging post-graduate curriculum involving didactic and clinical learning frameworks which closely model that of the medical curriculum delivered in Canadian medical schools (1). Like medical students, PA students endure intense academic and mental demands while completing their medical education, however, the PA student population is unique due to the accelerated framework and shorter program duration. Such demands pose risk to the mental health of PA students, with many experiencing symptoms of anxiety, depression, and burnout throughout their training (3). The mental health of medical students in Canada and the United States is well documented in the literature, revealing a high prevalence of depression, anxiety, and burnout symptoms that often persist as medical learners enter the workforce (4, 5). However, the research on the mental health of PA students is limited. Although civilian PAs have worked in Canada over the past 23 years, no studies, to our knowledge, have investigated the mental health of Canadian PA students.

Understanding the mental health of Canadian PA students is crucial as the profession continues to grow with the development of new PA education programs. By characterizing the mental health of PA students, programs can adopt strategies to identify, mitigate and prevent anxiety, depression, and burnout among students. In doing so, this could assist in preventing burnout among PA graduates, ultimately helping ensure new practitioners entering the healthcare system are at their best. To align with the previous research, this study will focus on understanding the prevalence and relationship of anxiety, depression, and burnout among Canadian PA students.

1.2 Burnout among Healthcare Providers

Burnout has been an increasingly recognized concern among healthcare providers. The US Agency for Healthcare Research and Quality has estimated that burnout may affect 10–70% of nurses and 30–50% of physicians, nurse practitioners, and physician assistants (6). Burnout is defined by the World Health Organization (WHO) as an occupational phenomenon classified as a syndrome resulting from unmanaged chronic workplace stress. Burnout is characterized by three closely related dimensions; 1) emotional exhaustion, 2) feelings of depersonalization and cynicism related to one's job, and 3) reduced professional efficacy.(7, 8). Emotional exhaustion is the emotional toll and physical depletion attributed to an individual's job and can manifest in individuals as feeling indifferent and uninvested towards their work. As emotional exhaustion progresses, it can lead to depersonalization and cynicism where individuals feel negatively towards and detached from their work. Reduced professional efficacy refers to feelings of incompetence and decreased work productivity, despite achievements (7, 8). These three dimensions of burnout are experienced by healthcare providers and medical learners, which may contribute to poorer quality of patient care (9,10). Moderate to high levels of burnout, specifically in the emotional exhaustion and cynicism dimensions, have been previously reported among the PA student population (11,12). Burnout has also been shown to be associated with suicidal ideation and withdrawal from medical education in both medical students and PA students (13–15).

Burnout can be assessed by using the 'gold standard' Maslach Burnout Inventory (MBI), a self-administered inventory including 22 items which assess the three dimensions of burnout (16). Multiple versions of the MBI exist and provide tailored items for burnout investigations of various populations such as students, medical personnel, educators, and human service workers.

For this study, the MBI-General Survey for Students (MBI-GS(S)) will be used to evaluate burnout in first- and second-year PA students (17).

1.3 Depression

Depression is a common mood disorder that involves a depressed mood, disruption to sleep, appetite and concentration, loss of pleasure or interest in activities for long periods of time, feelings of guilt and hopelessness as well as possible thoughts of suicide (18). A high prevalence of depression has been previously demonstrated among medical students studying in Canada and the US (4). Of the limited research conducted on PA students, it appears there is a similarly high prevalence of depression among PA students. One study in the US demonstrated that 98.37% of PA students in first and second year screened positive for at least minimal depression using the PHQ-9 depression screening method, and 47.15% of students showed mild to severe depression (19). Depression is also highly comorbid with anxiety. It has been estimated that approximately 85% of individuals with depression have significant anxiety, and 90% of individuals with anxiety disorder have depression (20). Considering the relationship between depression and burnout, depression has been shown to be significantly associated with elevated scores in the emotional exhaustion category of burnout among PA students (21).

1.4 Anxiety

Few studies have evaluated the specific prevalence of anxiety among medical trainees. Results from the limited literature suggest that medical students and PA students experience higher rates of anxiety compared to the general population (3). Multiple factors may contribute to anxiety in medical learners, including academic workload, time constraints, financial burden, exposure to patient deaths, numerous clinical evaluations, and sleep deprivation (22). One study

involving first- and second-year PA students from multiple US PA schools revealed that 84.4% of respondents experienced feelings of anxiety and the level of anxiety in PA students was found to be 65.3% higher compared with the national population (3). Similarly, a study involving eight PA programs in Virginia demonstrated that 43% of first- and second-year students surveyed were at risk for moderate or severe anxiety based on the GAD-7 (21). Like depression, anxiety in PA students may also be associated with emotional exhaustion, one of the three dimensions of burnout (21).

1.5 Purpose of Study

The current study will investigate the prevalence of anxiety, depression, and burnout symptoms among first- and second-year Canadian PA students enrolled at three accredited training sites. The study aims to characterize differences that may exist in the mental health of students in didactic year compared to clinical year, as well as any differences in student mental health between training sites. Relationships between the prevalence of anxiety, depression and burnout symptoms among Canadian PA students will be explored. Additionally, this study will assess the coping strategies used by students and their relationship to student mental well-being.

The following hypotheses will be tested.

- 1) A portion of Canadian PA students experience clinically significant symptoms of anxiety, depression and burnout while undergoing medical training.
- 2) The prevalence of anxiety, depression and burnout symptoms differ between first- and second-year PA students.
- 3) The prevalence of anxiety, depression, and burnout symptoms within first- and second-year PA students does not differ by training site.
- 4) A student's mental well-being is correlated to their use of adaptive or maladaptive coping strategies.

To investigate the proposed hypotheses, the following research questions are formulated:

- 1) What is the prevalence of anxiety, depression, and burnout symptoms in Canadian PA students?
- 2) Does the prevalence of anxiety, depression and burnout symptoms in Canadian PA students differ between didactic and clinical year of training?
- 3) Does the prevalence of anxiety, depression, and burnout symptoms differ across the three different Canadian PA programs?
- 4) Does the type of coping strategy used by a student relate to the student's mental well-being?

Understanding the impact of didactic versus clinical year on students' mental health can guide mental health resources and supports to be specifically tailored to meet the unique needs of students at various stages of their training. The outcomes of this study could be used to support the improvement of Canadian PA program structure, student mental health resources, as well as to promote early interventions for PA students struggling with anxiety, depression, or burnout. Furthermore, this study will provide a foundation for future research involving Canadian PA students and practicing PAs as minimal literature exists in this field currently.

2. Materials and Methods

2.1 Study Design and Setting

A cross-sectional online survey was developed and hosted on REDCap software, managed by the University of Manitoba. All three Canadian PA programs participated in the study: University of Manitoba Master of PA Studies (MPAS), McMaster University PA Education Program (PAEP), and University of Toronto Consortium of PA Education. The University of Manitoba's MPAS is a 26-month program in Winnipeg, MB with 15 students per

year. McMaster University's PAEP is a 24-month program in Hamilton, ON, with 34 first year and 27 second-year students. University of Toronto's PA program offers a 24-month distance/campus block learning model in Toronto, ON, with 46 first year and 31 second-year students. A total of 168 potential participants were identified across these programs.

Administrative representatives from each program distributed the survey by forwarding an email invitation (received from the primary investigator) containing the survey link to all first-and second-year PA students. This method ensured anonymity between participants and the investigator and allowed participants to access local student support networks should they have needed to seek emotional support because of their participation.

The administered survey consisted of four sections: 1) information and consent, 2) demographics, 3) current and past anxiety, depression, and burnout symptom measures and coping strategies, 4) crisis resources. Prospective student participants were provided a consent disclosure prior to beginning the study which included a full description of the study purpose, confidentiality statement and the potential harm (no more than minimal) of the survey. Survey data remained confidential, with no identifiable information collected, precluding specific follow-up for high-risk participants. Instead, general, and university-specific mental health resources were provided upon completion of the survey. The expected completion time of the survey was between 10-20 minutes. The survey remained open for 3 weeks with completion reminders sent by school contacts at the end of week 1 and beginning of week 3. There was no financial incentive for participants.

2.2 Research Ethics

Ethics approval was obtained from the University of Manitoba Health Research Ethics Board (HS26247 (H2023:352)).

2.3 Survey Measures

The demographic part of the survey consisted of six questions surrounding current education program, year of study, age, relationship status, children and attitudes surrounding financial situation as a source of stress. Prior history of mental health diagnoses, suicidal ideation, as well as receipt of care were assessed with questions derived from other surveys including a survey of medical students and the Stats Can population survey on mental health (23,24).

The Patient Health Questionnaire-9 (PHQ-9) was used to measure depression. The PHQ-9 is a validated self-report depression screening tool composed of nine items developed from the DSM-IV depressive disorders criteria and set over the time frame of the last 2 weeks. Each item is scored on a four-point Likert scale (0 = not at all to 3 = nearly every day). The total PHQ-9 score can range from 0 to 27 (25). Responses from each item are tallied to obtain a total score. Ranges of total scores suggest varying depression severity (0-4 = none-minimal, 5-9 = mild, 10-14 = moderate, 15-19 = moderately severe, 20-27 = severe) (25) (**Appendix 1**).

The Generalized Anxiety Disorder Scale (GAD-7) was used to measure anxiety. The GAD-7 is a validated self-report screening tool for anxiety disorders and is comprised of seven items reflective of the DSM-IV symptom criteria for GAD. Each item is scored on a four-point Likert scale from (0 = not at all, to 3 = nearly everyday). The total GAD-7 score can range from 0 to 21 (26). Responses from each item are tallied to obtain a total score. Ranges of total scores suggest

varying anxiety severity (0-4=minimal, 5-9=mild anxiety, 10-14=moderate anxiety, 15-21=severe anxiety) (26). (**Appendix 1**).

The Maslach Burnout Inventory General Survey for Students (MBI-GS(S)) was used to assess burnout. The MBI-GS(S) is a validated self-report screening tool for burnout in university students, comprised of three subscales measuring emotional exhaustion (EE) (5 items), cynicism (CY) (5 items), and professional efficacy (PE) (6 items). A seven-point Likert scale (0 = never to 6 = everyday) is used for each question. Using a scoring key, responses corresponding to each of the three subscales are totaled and both average and total scores for each subsection are determined. Average scores were obtained by dividing the subscale total score by the number of answered subscale items for an average subscale score. The MBI does not provide cut-off scores as it is not intended for diagnostics, however based on past burnout literature, burnout is depicted by high EE, CY and low PE scores (27,28). Licensing to administer the MBI-GS(S) was purchased and obtained from MindGarden Inc for the purpose and single use of this study.

Maladaptive and adaptive coping mechanisms were assessed using a list of copying styles from prior studies (29). Respondents indicated how often they used outlined coping skills ('frequently', 'sometimes', 'never'). (**Appendix 1**). General and university specific mental health crisis resources were provided in the invitation email as well as upon completion of the survey.

2.4 Data Collection

Survey responses were collected electronically through REDCap. No personal information, IP, email or location information was collected to ensure the confidentiality of

participants. Response data were exported from REDCap into Excel and stored in a password protected file on the primary investigator's password protected computer.

2.5 Statistical Analysis

Raw data, data labels and data dictionary files were exported from REDCap into Excel. Data files were inspected for missing or incomplete data. For the PHQ-9, GAD-7, if >2 variables were missing in a given measure, the total score for that measure was not calculated. If 1-2 variables were missing, an average of the remaining responses was calculated and used for the missing values. Total scores were calculated and coded into the respective severity categories. Mean scores for each MBI subscale were calculated by summing the available scores and dividing by the number of items responded to. Statistical analysis was completed in SPSS v29. Demographic variables, and overall prevalence of anxiety, depression and burnout were summarized descriptively. To assess the assumption of homogeneity of variances between groups, tests of equality of variances using Levene's test were conducted, and subsequent t-tests were used to compare means between groups. Differences in PHQ-9, GAD-7 and MBI results among all first-year students and all second-year students were assessed using analysis of variance (ANOVA). Where significant differences were detected, a Bonferroni post-hoc multiple comparisons test was used to identify differences between groups. The results were considered statistically significant at a level of $p < 0.05$.

3. Results

3.1 Descriptive Statistics

Participant demographics are summarized in **Table 1**. Of 168 potential respondents, 78 completed the demographic portion of the survey (response rate of 46.4%) and 73 completed the remainder of the survey yielding a total response rate of 43.4%. The distribution of participants across academic years was relatively even, with 42 first-year students (53.8%) and 36 second-year students (46.2%). Response rates varied across universities. University of Manitoba displayed the highest response rate (93.3%), compared to McMaster University and University of Toronto (34.4% and 37.6%, respectively). Most participants were aged 25 years or younger (56.4%), while remaining participants identified as 26 years of age or older (43.6%). Most participants identified as being in a committed relationship (53.8%) and most respondents (94.9%) do not have any children.

Demographic Data

	N	(%)
Year of Study		
Year 1	42	53.8
Year 2	36	46.2
School		
University of Manitoba	28	35.9
McMaster University	21	26.9
University of Toronto	29	37.2
Age		
25 and younger	44	56.4
26 and older	34	43.6
Relationship Status		
Single	24	30.8
Committed Relationship	42	53.8
Married	12	15.4
Number of Children/Dependants		
None	74	94.9
One or more	4	5.1

Views on finances as current source of stress		
Strongly disagree	3	3.8
Disagree	19	24.4
Neither agree nor disagree	12	15.4
Agree	34	43.6
Strongly agree	10	12.8

Table 1. Demographic participant data from all first- and second-year PA students across three Canadian PA programs.

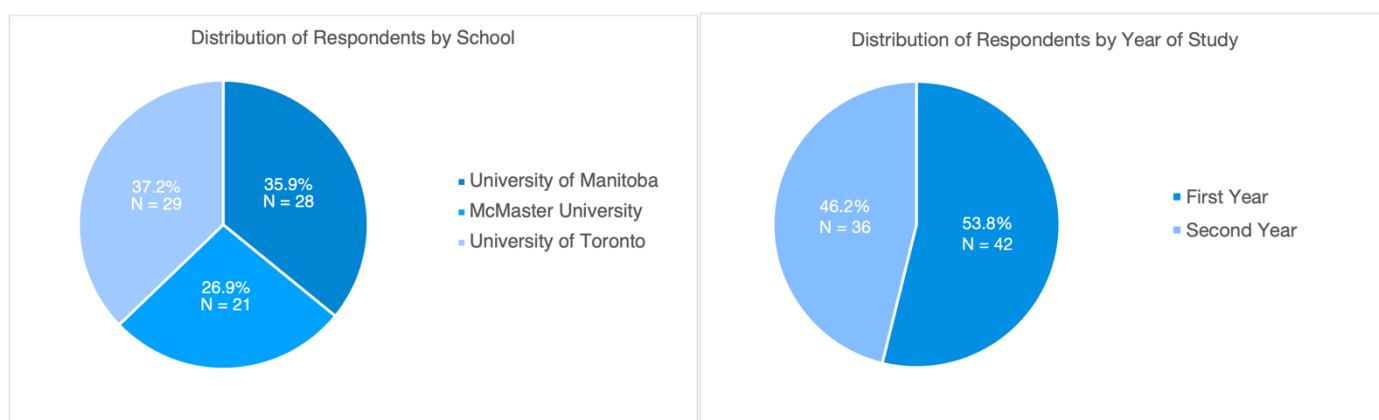


Figure 1. Respondent demographics; year of study and school (n=78).

3.2 Overall Past and Current Mental Health

The total reported utilization of mental health services over the past 12 months by all first- and second-year PA students is illustrated in **Table 2.** and **Figure 2.** Of the total respondents, 34.2% (n = 25) indicated they saw a health professional in person or virtually regarding their mental health in the last 12 months. Of that 34.2% that received mental health care, 40% indicated that they saw a primary care provider (family physician, nurse practitioner or practicing PA), 16% saw a psychiatrist, 16% saw a psychologist, 16% saw another medical specialist and 60% saw another therapist/counsellor (responses not mutually exclusive). No respondents indicated having used a crisis hotline, attended an emergency department, crisis center, or required hospitalization for a mental health reason in the past 12 months (Table 2).

Total mental health service utilization in past 12 months

Value	N	(%)
Total respondents who saw a health professional for mental health	25	34.2
Total respondents who did not see a health professional for mental health	48	65.8
Of those who saw a mental health provider:		
Primary Care Provider	10	40.0
Psychiatrist	4	16.0
Psychologist	4	16.0
Other medical specialist	4	16.0
Other therapist/counsellor	15	60.0

Table 2. Total utilization of mental health services over the past 12 months by first- and second-year PA students from all three schools.

Mental health treatment history including previous and current treatments reported is summarized in **Table 3**. Of the 73 responses, 24.7% reported previously using medication, 46.6% previously had psychotherapy and 2.7% previously used another form of treatment. At the time of the survey, 21.9% of respondents indicated current medication use, 19.2% were engaging in psychotherapy and 1.4% were engaged in another form of treatment for their mental health. At the time of the survey, 12.2% of first year students and 9.4% of second year students had considered dropping of PA training over the past month due to their mental well-being.

Past and Current Treatment History for Mental Health

Treatment Type	Previous Usage		Current Usage	
	N	(%)	N	(%)
First and Second Year Students				
Medication	18	24.7%	16	21.9%
Psychotherapy	34	46.6%	14	19.2%
First Year Students				
Medication	-	24.4	-	19.5
Psychotherapy	-	48.8	-	12.2
Second Year Students				

Medication	-	25.0	-	25.0
Psychotherapy	-	43.8	-	28.1

Table 3. Total reported treatment history and current treatment for mental health among first- and second-year PA students from all three programs.

By Year of Study

Regarding medication use for treatment of mental health; 24.4% of first-year students and 25.0% of second-year students reported previous use. At the time of the study, 19.5% of first-year students and 25.0% of second-year students reported current medication use. There was no significant association between year of study and previous or current medication status ($\chi^2 = 0.004$, $p=0.952$; $p>0.05$) and ($\chi^2 = 0.316$, $p=0.574$; $p>0.05$) respectively.

Regarding psychotherapy, 48.8% of first-year students and 43.8% of second-year students reported previously receiving psychotherapy with no significant difference ($\chi^2 = 0.183$, $p=0.669$; $p>0.05$). At the time of the study, 12.2% of first-year students and 28.1% of second-year students were currently engaging in psychotherapy. Although more second-year students were receiving psychotherapy compared to first-year students, this difference was not significant, ($\chi^2= 2.942$, $p=0.086$; $p>0.05$).

By PA Program

Regarding medication use, 26.9% of UofM PA students, 26.3% of McMaster PA students and 21.4% of UofT PA students have previously taken medication for their mental health. At the time of the study, 26.9% of UofM PA students, 21.1% of McMaster University PA students and 17.9% of UofT PA students were currently taking medication. There is no significant association

between previous or current medication and PA school ($\chi^2= 0.257, p= 0.879; p>0.05$) and ($\chi^2= 0.659, p= 0.719; p>0.05$) respectively.

Regarding psychotherapy, 46.2% of UofM students, 57.9% of McMaster students and 39.3% of UofT students reported previous psychotherapy. At the time of the study, 30.8% of UofM students, 21.1% of McMaster students and 7.1% of UofT students were engaging in psychotherapy. There was no significant difference between past psychotherapy and PA school ($\chi^2 = 1.578, p= 0.454; p>0.05$) and ($\chi^2 = 4.913, p= 0.086; p>0.05$) respectively.

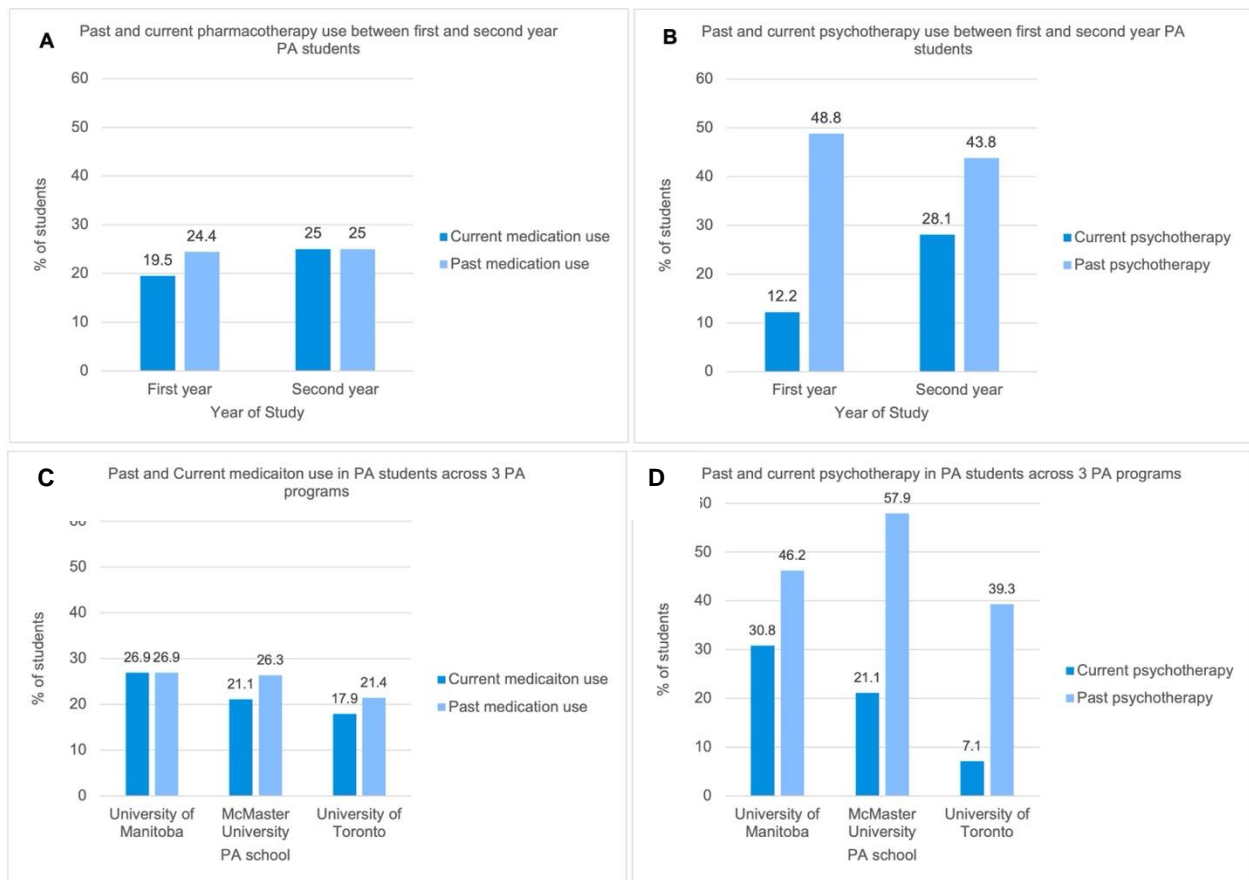


Figure 3. (A) % of students reported previous and current medication use by year of study. **(B)** % of students reported previous and current psychotherapy use by year of study. **(C)** % of students reported previous and current medication use by PA program. **(D)** % of students reported previous and current psychotherapy use by PA program.

3.3 Prevalence of Depression

Of 73 respondents, 19.2% (n=14) reported a previous diagnosis of depression, while 79.5% (n=58) stated no prior diagnosis, and 1.4% (n=1) were unsure. Regarding prior experience of depressive symptoms, 72 students provided responses. Among them, 36.1% reported previously experiencing symptoms of depression, 58.3% reported no prior symptoms, and 5.6% were unsure. Of the 73 responses regarding consideration of suicidal ideation (SI), none indicated this to be true. Past diagnosis and symptom experience history of depression is illustrated in **Table 4**.

Past diagnosis and symptom history of depression

Past diagnosis history	N	(%)
Previous diagnosis of depression	14	19.2
No prior diagnosis of depression	58	79.5
Unsure of prior diagnosis of depression	1	1.4
Past symptom history	N	(%)
Had experienced depressive symptoms previously	26	36.1
Had <u>not</u> experienced depressive symptoms previously	42	58.3
Unsure if previously experienced depressive symptoms	4	5.6

Table 4. Past diagnostic and symptom experience history of depression among all first- and second-year PA students across the three programs.

Total PHQ-9 scores from all first- and second-year PA students ranged from 0 to 23, with a mean score of 7.31 ($SD = 4.74$). First year PA students (N=41) reported a mean PHQ-9 score of 7.85 ($SD = 5.33$), while second year PA students (N=32) reported a slightly lower mean PHQ-9 score of 6.61 ($SD=3.82$). According to the PHQ-9 scoring criterion (score 0-4=none/minimal, 5-9 mild, 10-14 moderate, 15-19 moderately severe, 20-27 severe depression) 45.2% of all first- and second-year respondents scored within the ‘mild’ depression range, 15.1% within the ‘moderate’ range, 8.2% within ‘moderately severe’, 1.4% within the ‘severe’ range and 30.1% within the

‘none-minimal’ range. No significant differences were found in total PHQ-9 scores between first- and second-year PA students, or between schools.

PHQ-9 scores

Variable	N	Range	Mean	Std. Dev	Sig. p-value
PHQ-9 scores (1 st Year)	41	-	7.85	5.33	.267
PHQ-9 scores (2 nd Year)	32	-	6.61	3.82	
PHQ-9 scores (1 st & 2 nd year students)	73	0 - 23	7.31	4.74	
Total PHQ-9 scores by PA program					
University of Manitoba	26	0 - 18	8.19	4.37	.167
McMaster University	19	1 - 17	5.58	4.04	
University of Toronto	28	1 - 23	7.66	5.32	

Table 5. PHQ-9 scores by year of study, total first- and second- year PA students and by PA program.

Severity cut-offs of PHQ-9 scores for total first-and-second year PA students

Severity	N	%
Total	73	100
None-Minimal (0-4)	22	30.1
Mild (5-9)	33	45.2
Moderate (10-14)	11	14.1
Moderately Severe (15-19)	7	9

Table 6. Severity cut-offs for PHQ-9 scores of total first- and second- year PA students.

Due to small cell count in the ‘Severe (20-27)’ category, it was combined with the ‘Moderately Severe (15-19)’ category.

3.4 Prevalence of Anxiety

Of 73 students, 24.7% reported a previous diagnosis of an anxiety disorder, while 74.0% reported no prior diagnosis, and 1.4% were unsure. Regarding prior experience of anxiety symptoms, 72 students provided responses. Of these, 63.9% reported previously experiencing anxiety symptoms, 27.8% reported no prior symptoms, and 8.3% were unsure. Total GAD-7

scores from all first- and second-year PA students ranged from 0 to 20, with a mean score of 8.27 ($SD = 5.28$). First year PA students ($n=41$) reported a mean GAD-7 score of 9.32 ($SD = 5.56$), while second year PA students ($n=32$) reported a mean GAD-7 score of 6.93 ($SD = 4.65$). According to the GAD-7 scoring criterion (score 0–4: minimal anxiety, 5–9: mild anxiety, 10–14: moderate anxiety, 15–21: severe anxiety), 36.1% of first- and second-year students scored within the ‘mild anxiety’ range, 20.8% within the ‘moderate anxiety’, 16.7% within ‘severe anxiety’ and 26.4% within the none-minimal anxiety’ range.

There was a marginally significant difference in mean GAD-7 scores between years of study, with first year students having significantly higher scores (9.32 vs 6.94, $p = 0.055$; $p > 0.05$, Cohen’s $d=0.460$). While the difference in mean GAD-7 between first- and second-years is marginally significant, the moderate effect sizes for the GAD-7 (Cohen’s $d = 0.460$) suggest a meaningful difference between first- and second-years. There was also a significant difference in total GAD-7 scores between schools ($p=0.040$; $p < 0.05$). Post-hoc testing revealed significant differences in mean GAD-7 scores between UofM students and McMaster students, with UofM displaying highest mean GAD-7 scores and McMaster the lowest (9.96 vs 5.95, $p = 0.035$; $p < 0.05$).

Past diagnosis and symptom history of anxiety

Past diagnosis history	N	(%)
Previous diagnosis of anxiety	18	24.7
No prior diagnosis of anxiety	54	74.0
Unsure of prior diagnosis of anxiety	1	1.4
Past symptom history	N	(%)
Had experienced anxiety symptoms previously	46	63.9
Had <u>not</u> experienced anxiety symptoms previously	20	27.8
Unsure if previously experienced anxiety symptoms	6	8.3

Table 7. Past diagnostic and symptom experience history of anxiety among all first-and second-year PA students across the three schools.

GAD-7 scores (First- and Second-Year PA Students)

Variable	N	%	Range	Mean	Std. Dev	Sig. p-value
GAD-7 scores - First Year Students	41	-	-	9.321	5.567	0.055
GAD-7 scores – Second Year Students	32	-	-	6.937	4.651	
GAD-7 scores Total First- & Second-Year Students	73	-	0 - 20	8.276	5.286	
University of Manitoba	26	-	1 - 20	9.9551	5.535	0.040
McMaster University	19	-	0 - 16	5.9474	5.027	
University of Toronto	29	-	0 - 17	8.2976	4.773	
GAD-7 scores ANOVA						0.040
University of Manitoba vs McMaster University						0.035
University of Manitoba vs University of Toronto						0.716
McMaster University vs University of Toronto						0.381

Table 8. GAD-7 scores by year of study, total first-and-second year PA students and by PA program. *sig. difference between first- and second-year GAD-7 scores (0.055). GAD-7 scores ANOVA between PA programs. *sig. difference between PA programs (0.040): University of Manitoba vs McMaster University GAD-7 scores (0.035).

Severity cut-offs of GAD-7 scores for total first-and-second year PA students

Severity	N	%
Total	73	100
Minimal (0-4)	19	26.4
Mild (5-9)	26	36.1
Moderate (10-14)	15	20.8
Severe (15-21)	12	16.7

Table 9. Severity cut-offs for GAD-7 scores of total first- and second-year PA students.

3.5 Prevalence of Burnout

Average and total scores were computed for each of the MBI-GS(S) subscales (EE, CY, PE). Average subscale scores for all first- and second-year PA students were as follows; EE scores ranged from 1 to 7, with a mean of 5.29 ($SD = 1.34$). CY scores ranged from 1 to 7 with a mean of 3.25 ($SD = 1.53$). PE scores ranged from 3 to 7 with a mean of 5.43 ($SD=0.97$). In first year PA students only ($n=41$), EE scores were 5.207 ($SD=1.47$), CY scores were 3.35 ($SD=1.47$) and PE scores were 5.47 ($SD=1.06$). In second year PA students ($n=32$), EE scores were 5.40 ($SD=1.20$), CY scores were 3.12 ($SD=1.61$) and PE scores were 5.38 ($SD=0.86$). These results are summarized in **Table 10**. Total subscale scores are summarized in **Table 11**. No significant differences were found for any of the scores for the 3 subscales of burnout (EE, CY, PE) between first- and second-year PA students or between the 3 programs.

MBI-GS(S) subscale average scores for EE, CY, PE in first- and second-year PA students

Measure	Min.	Max.	Mean	Standard Deviation
MBI-SS Subscale Avg Scores - (First & Second Year)				
MBI-GS(S)-Avg EE	1	7	5.29	1.34
MBI-GS(S)-Avg CY	1	7	3.25	1.53
MBI-GS(S)-Avg PE	3	7	5.43	0.97
MBI-SS Subscale Avg Scores - (First Year)				
MBI-GS(S)-Avg EE	-	-	5.20	1.47
MBI- GS(S)-Avg CY	-	-	3.35	1.47
MBI- GS(S)-Avg PE	-	-	5.47	1.06
MBI-SS Subscale Avg Scores - (Second Year)				
MBI-GS(S)-Avg EE	-	-	5.40	1.20
MBI-GS(S)-Avg CY	-	-	3.12	1.61
MBI-GS(S)-Avg PE	-	-	5.38	0.86

Table 10. Mean average subscale scores for the MBI-GS(S) for first year students, second year students and combined first-and second-year students.

MBI-GS(S) total subscale scores for EE, CY, PE in first- and second-year PA students

Measure	(N)	(%)	Min.	Max.	Mean	Standard Deviation
MBI-GS(S) Subscale Total Scores - (First & Second Year)						
MBI-GS(S)–Total EE	71	-	5	35	26.57	6.85
MBI-GS(S)– Total CY	72	-	5	35	16.22	7.68
MBI-GS(S)– Total PE	73	-	18	42	32.60	5.86

Table 11. Mean Total subscale scores for the MBI-GS(S) for all first- and second-year students.

3.6 Relationships between anxiety, depression, burnout, and coping

The relationships between PHQ-9, GAD-7, MBI-GS(S) subscales, and coping styles are outlined in **Table 11**. PHQ-9 scores were found to be positively correlated with GAD-7 scores ($r = 0.698$, $p < 0.01$), EE ($r = 0.548$, $p < 0.01$) and CY ($r = 0.478$, $p < 0.01$), indicating that higher scores on the PHQ-9 tend to coincide with higher scores on the GAD-7, EE and CY. PHQ-9 scores were positively correlated with maladaptive coping mechanisms ($r = 0.285$, $p < 0.05$), suggesting that using maladaptive coping mechanisms is associated with higher depression scores.

GAD-7 scores were found to be positively correlated with EE ($r = 0.571$, $p < 0.01$) and CY ($r = 0.509$, $p < 0.01$). GAD-7 scores are also significantly positively correlated with maladaptive coping mechanisms ($r = 0.339$, $p < 0.01$), suggesting that using maladaptive coping mechanisms is associated with higher anxiety scores.

PE subscale was found to be negatively correlated with EE ($r = -0.341$, $p < 0.01$) and CY subscales ($r = -0.350$, $p < 0.05$), suggesting that higher PE is associated with lower EE and CY. Maladaptive coping styles were positively correlated with EE ($r = 0.318$, $p < 0.01$), and CY ($r = 0.317$, $p < 0.01$) subscales of burnout, suggesting that maladaptive coping mechanisms are

associated with higher burnout scores on these two subscales. Maladaptive coping styles were found to be negatively correlated with PE ($r = -0.337, p < 0.01$) subscale while adaptive coping styles were positively correlated with PE ($r = 0.294, p < 0.05$) subscale.

Relationships between PHQ-9, GAD-7, MBI-GS(S), coping styles, age, and year of study.

	PHQ-9	GAD-7	MBI - EE	MBI - CY	MBI - PE	Year of study	Age	Maladaptive coping style	Adaptive coping style
PHQ-9		$p < 0.001$ $r = 0.698^{**}$	$P < 0.001$ $r = 0.548^{**}$	$P < 0.001$ $r = 0.478^{**}$	NS	NS	NS	$p = 0.015$ $r = 0.285^*$	NS
GAD-7	$P < 0.001$ $r = 0.698^{**}$		$p < 0.001$ $r = 0.571^{**}$	$p < 0.001$ $r = 0.509^{**}$	NS	NS	NS	$p = 0.004$ $r = 0.339^{**}$	NS
MBI - EE	$p < 0.001$ $r = 0.548^{**}$	$p < 0.001$ $r = 0.571^{**}$		$p < 0.001$ $r = 0.562^{**}$	$p = 0.003$ $r = -0.341$	NS	NS	$p = 0.006$ $r = 0.318^{**}$	NS
MBI - CY	$p < 0.001$ $r = 0.478^{**}$	$p < 0.001$ $r = 0.509^{**}$	$p < 0.001$ $r = 0.562^{**}$		$P < 0.033$ $r = -0.250^*$	NS	NS	$p = 0.007$ $r = 0.317^{**}$	NS
MBI - PE	NS	NS	$p = 0.003$ $r = -0.341$	$p = 0.033$ $r = -0.250^*$		NS	NS	$p = 0.004$ $r = -0.337^{**}$	$p = 0.012$ $r = 0.294^*$
Year of study	NS	NS	NS	NS	NS		NS	NS	NS
Age	NS	NS	NS	NS	NS	NS		NS	NS
Maladaptive coping style	$p = 0.015$ $r = 0.285^*$	$p = 0.004$ $r = 0.339^{**}$	$p = 0.006$ $r = 0.318^{**}$	$p = 0.006$ $r = 0.318^{**}$	$p = 0.004$ $r = -0.337^{**}$	NS	NS		NS
Adaptive coping style	NS	NS	NS	NS	$p = 0.012$ $r = 0.294^*$	NS	NS	NS	

Table 11. Statistically significant correlations between GAD-7, PHQ-9, and MBI-GS(S) subscales. Correlations are denoted by Pearson correlation coefficients (r), as well as a p -value. Statistical significance is noted with $**$ and $*$ symbols, indicating significant correlations at the 0.01 and 0.05 levels, respectively. Bolded values indicate a strong positive correlation.

Underlined values indicate a negative r and thus a negative correlation. NS denotes non-significant values $p > 0.05$.

4. Discussion

The current study examined the mental health of first- and second-year Canadian Physician Assistant students from three universities focusing on anxiety, depression, and burnout. The goal of this study was to investigate the overall prevalence of anxiety, depression, and burnout symptoms in PA students, understand differences by year of study and PA program, as well as understand how different coping styles relate to a student's mental well-being.

Demographics

The survey yielded an acceptable total response rate of 43.4%, with a respondent population demographic that is consistent with the average age of PA students in other studies, suggesting the survey captured a representative sample. A large portion of respondents indicated they were in a committed relationship and most students (94.9%) do not have children, indicating that child/family responsibilities are not a significant factor in the student experience within this population.

Past mental health

One third of respondents indicated they had seen a health professional for their mental health in the past 12 months, indicating high need with respect to mental health difficulties, as well as a high willingness to seek professional help. The majority of PA students who sought

help did so from a primary care provider (MD, PA, NP), consistent with these providers frequently being the first point of contact for mental health (30). Therapist/counsellor contacts were also common which may indicate relative availability of these providers through school-based or community services, or preference for psychotherapeutic intervention. Help-seeking, use of medication and counselling did not differ significantly between years of study or programs. However, current psychotherapy use was over double among second year students compared to first year, possibly indicating higher need or higher interest and/or access to this form of treatment.

Prevalence of depression

Nearly one in five participants reported a prior diagnosis of depression and roughly one third of students reported previously experienced depressive symptoms, indicating depression is a significant concern among first- and second-year PA students. PHQ-9 results showed that nearly half of all PA students scored within the ‘mild’ depression range, while about one quarter scored between the ‘moderate’ to ‘severe’ ranges. These findings are similar, if not more severe, compared to previous literature (19). Consistent with previous findings, there were no significant differences in depression scores between academic years or programs, suggesting that the level of depressive symptoms is consistent across didactic and clinical phases of training, regardless of site (19). The absence of reported suicidal ideation is reassuring and may suggest that while a high prevalence of depressive symptoms are present among PA students, it doesn’t often escalate to severe levels. Our findings that depression has a strong positive correlation to anxiety and emotional exhaustion, are consistent with findings in other PA student populations (21).

Prevalence of anxiety

Like depression, anxiety is prevalent among the PA student population with almost one quarter of PA students reporting prior diagnosis and over half indicating they had previously felt anxiety symptoms. The prevalence of anxiety and depression among PA students is important to address as students experiencing these symptoms may have impaired academic performance due to affected concentration, memory and decision making (31). Our findings are consistent with previous studies, demonstrating high levels of mild, moderate, and severe anxiety based on GAD-7 scores (3,21). While only marginally significant, the higher GAD-7 scores in first year students compared to second year may reflect the challenges first-year students face while transitioning into a rigorous program, or possibly anxiety arising from increased academic stressors and evaluations that are more prevalent in the didactic portion of PA training. The significant difference in GAD-7 between University of Manitoba and McMaster University, with University of Manitoba having higher scores should be taken with caution due to the uneven response rates between programs. This result may be influenced by non-response bias at McMaster University, meaning specific groups of students (like those experiencing high anxiety) may not have participated in the survey, underestimating GAD-7 scores. It is possible this finding reflects a difference in program structure, academic environment, campus culture or available mental health services between these two programs.

Prevalence of burnout

While the MBI-GS(S) may provide valuable insight into the burnout symptoms PA students may experience throughout their training, there are no universal validated cut-offs for

any MBI scores as it is not intended as a diagnostic instrument. Cut-off values used in previous studies vary, with few studies specifically using MBI-GS(S) version in similar populations, making it difficult to make direct comparison with the results of other studies.

Considering our definition of burnout based on previous literature (depicted by high EE, CY and low PE scores), our results appear to display notably higher levels of EE and CY, indicating that burnout is likely prevalent among first- and second-year PA students. This may reflect the high academic workload, difficult content, and demands of clinical placements throughout PA school.

However, PE levels were notably high, indicating that PA students generally feel confident, and competent in their studies and career choices as PAs. Despite high PE levels being a protective factor against burnout, it is still essential to address and reduce burnout during training years, as it may persist as students graduate and begin their working careers. Preventing burnout is crucial as healthcare providers experiencing burnout are more likely to make medical errors which may jeopardize patient care and safety (32).

The relationship between depression, anxiety, and burnout

The positive correlations found between PHQ-9, GAD-7, EE and CY burnout subscales support a strong link between anxiety, depression and burnout among PA students. Furthermore, coping styles appear to play a crucial role in shaping the mental health of PA students, with maladaptive coping mechanisms associated with increased anxiety, depression and burnout, and adaptive coping mechanisms associated with higher professional efficacy, a protective factor against burnout. These relationships emphasized the need for PA programs to provide mental

health supports and interventions for students during their training. Research exploring burnout and wellness programs in American PA students demonstrated that 77% of participants expressed interest in participating in wellness programs to reduce burnout, not only indicating burnout is of high concern, but that students are willing to engage in wellness initiatives (11). Potential wellness strategies PA programs could employ to improve students' current and future well-being include mindfulness training, extracurricular activities such as music and physical activity, and resilience training in the form of discussions surrounding coping, positive thinking, self-confidence (31). Finally, while mental health awareness and acceptance has improved in recent years, continued efforts must be made to destigmatize mental illness as this remains a barrier to self-identification and help-seeking among medical providers (31).

Limitations

While this study offers valuable insights, it has several limitations. Firstly, there was a significantly higher response rate from the University of Manitoba (93%) compared to McMaster University (34.4%) and University of Toronto (37.6%) which may reflect varying levels of engagement due to the PI attending the University of Manitoba, or differing survey distribution methods across institutions. This raises concerns about the generalizability of the results, particularly from schools with lower response rates.

Secondly, the timing of survey distribution in February could have introduced bias in responses to the GAD-7, PHQ-9, MBI-GS(S) and coping styles in both first- and second-year students due to differing academic schedules and stress levels. Similarly, all second-year students in clerkship are rotating through different medical specialties. An individual's rotation during that time may

be more or less demanding or stressful than another student's, influencing both the content of their responses, as well as the response rate.

Lastly, given the multiple scoring approaches to the MBI-GS(S) and the lack of validated cut-offs in the literature, it is difficult to report and compare burnout levels. Alternative burnout measures may be better suited for further burnout research among the PA population.

Addressing these limitations in future research may enhance the reliability and generalizability of the findings, allowing for a more comprehensive understanding of the mental health of Canadian PA students.

5. Conclusion

This study investigated the prevalence of anxiety, depression, and burnout symptoms, as well as previous mental health and coping styles, among first- and second-year PA students across three PA programs. The findings of this study provide a necessary foundation to understanding the overall mental health of the Canadian PA student population that has not previously been explored. Taken together, these findings support both a high prevalence as well as strong link between anxiety, depression, and burnout among Canadian PA students. Our findings highlight a significant concern for PA student mental health and emphasize the need for interventions to recognize, treat and prevent these symptoms within physician assistant training. Our results further enforce the critical role that coping styles play in influencing overall mental well-being. Further research may be directed towards understanding the factors that contribute to

depression, anxiety, and burnout among PA students, in addition to determining effective mitigating solutions. As PAs continue to play an increasingly important role in Canadian healthcare, focus should be placed on promoting adaptive coping mechanisms and building resilience, providing support for students and furthering research surrounding the mental health of both student and practicing PAs.

Appendix 1.
Survey Instruments

Instrument 1. Demographic & additional questions

Which school do you currently attend?
<ol style="list-style-type: none"> 1. University of Manitoba - Master of Physician Assistant Studies 2. McMaster University - Physician Assistant Education Program 3. University of Toronto - Consortium of Physician Assistant Education
What year of the program are you in?
<ol style="list-style-type: none"> 1. Year 1 2. Year 2
How old are you currently?
<ol style="list-style-type: none"> 1. 25 or under 2. 26-35 3. 36-45 4. 46-55 5. 56 and older
How would you characterize your current relationship status?
<ol style="list-style-type: none"> 1. Single 2. In a committed relationship 3. Married 4. Divorced 5. Widowed
How many children do you have?
<ol style="list-style-type: none"> 1. None 2. One 3. Two or more
My financial situation is a source of significant stress.
<ol style="list-style-type: none"> 1. Strongly disagree 2. Disagree 3. Neither agree nor disagree 4. Agree 5. Strongly agree
Have you ever been diagnosed as depressed?
<ol style="list-style-type: none"> 1. Yes 2. No 3. Not sure
Have you ever felt you were seriously depressed even if not diagnosed?
<ol style="list-style-type: none"> 1. Yes 2. No 3. Not sure
Since enrolling in your PA training, have you ever seriously considered committing suicide?
<ol style="list-style-type: none"> 1. Yes 2. No
Have you ever been diagnosed as having an anxiety disorder?
<ol style="list-style-type: none"> 1. Yes 2. No 3. Not sure
Have you ever felt you struggled with significant anxiety even if not diagnosed?

<ol style="list-style-type: none"> 1. Yes 2. No 3. Not sure
Over the past 12 months, have you seen or talked on the telephone or over the Internet to any health care professionals about problems with your emotions, mental health or use of alcohol or drugs. If yes, to whom: (check all that apply):
<ol style="list-style-type: none"> 1. Yes 2. No <ol style="list-style-type: none"> a) Primary care provider (family doctor, nurse practitioner, practicing PA) b) Psychiatrist c) Other medical specialist d) Psychologist e) Other counsellor or therapist
Over the past 12 months, have you ever used a crisis hotline, attended an emergency department, crisis centre, or been hospitalized for a mental health reason?
<ol style="list-style-type: none"> 1. Yes 2. No
Have you ever received any of the following treatments for a mental health need?
<ol style="list-style-type: none"> 1. Medication 2. Psychotherapy/counselling 3. Other: specify
Are you currently receiving any of the following treatments for a mental health need (check all that apply)
<ol style="list-style-type: none"> 1. Medication 2. Psychotherapy/counselling 3. Other: specify
Over the past months, have you considered dropping out of PA training because of your mental well-being?
<ol style="list-style-type: none"> 1. Yes 2. No

Instrument 1. Demographic and additional questions regarding depression, anxiety, and past mental health history(23,24).

Instrument 2. PHQ-9

Over the last 2 weeks, how often have you been bothered by any of the following problems?	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things	0	1	2	3
Feeling down, depressed, or hopeless	0	1	2	3
Trouble falling or staying asleep, or sleeping too much	0	1	2	3
Feeling tired or having little energy	0	1	2	3
Poor appetite or overeating	0	1	2	3
Feeling bad about yourself – or that you are a failure or have let yourself or your family down	0	1	2	3

Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
Moving or speaking so slowly that other people could have noticed? Or the opposite – being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

Instrument 2. PHQ-9 questions and Likert scale used in the survey to measure depressive symptoms in PA students over the previous 2 weeks.

Instrument 3. GAD-7

Over the last two weeks, how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid, as if something awful might happen	0	1	2	3

Instrument 3. GAD-7 questions and Likert scale used in the survey to measure anxiety symptoms in PA students over the previous 2 weeks.

Instrument 4. MBI-GS(S) Burnout Measure Sample (EE, CY, PE)

If you have had this feeling, indicate how often you feel it by selecting the phrase that best describes how frequently you feel that way.	Never	A few times a year	Once a month or less	A few times a month	Once a week	A few times a week	Everyday
I feel emotionally drained by my studies	0	1	2	3	4	5	6
In my opinion I am a good student	0	1	2	3	4	5	6
I doubt the significance of my studies	0	1	2	3	4	5	6

Instrument 4. MBI-GS(S) sample questions and Likert scale used in the survey to measure burnout symptoms (specifically emotional exhaustion, cynicism, and professional efficacy) in PA students.

Instrument 5. Coping Styles

Adaptive Coping Styles	
1.	Intuitive: using imagination, feelings, and perceptions to solve a problem
2.	Logical, rational: carefully reasoned in a logical and deductive style
3.	Trial and error: exploring solutions (e.g., if one fails, modifying and engaging in another)
4.	Help-seeking: gathering information and then proceeding
5.	Self-care: pursuing wellness through nutrition, exercise, stress management, or sleep hygiene
6.	Wait and see: allowing time or circumstance to determine the outcome
7.	Action-oriented: taking action to immediately rectify the problem
8.	Contemplation: quietly thinking over the problem before acting
9.	Spiritual: prayer or asking for direction
10.	Emotional: using emotions, such as sadness or anger, to direct problem-solving
11	Directing, controlling oneself, or directing others to solve a problem
12	Manipulative: using various manipulative styles to resolve the crisis
Maladaptive Coping Styles	
1.	Use of alcohol or drugs
2.	Feeling overwhelmed, developing panic, anxiety, or depression
3.	Deceptive, antisocial: use of dishonesty, lying, cheating, or stealing to resolve a crisis
4.	Suicidal: using threats of suicide or suicide attempts to cause someone to solve a problem
5.	Violence: using threats or actual violence to establish control and solve a problem
6.	Avoidance or denial: failure to confront or acknowledge a problem
7.	Somatization; displaying physical symptoms as a method of expressing emotions
8.	Impulsive: unpredictable or impulsive responses, without anticipation of possible consequences or outcomes
9.	Random, chaotic: non-productive and an extreme form of trial and error with an impulsive style; often seen in prolonged traumatic or psychotic states

Instrument 5. Adaptive and Maladaptive coping styles/questions used in the survey, with permission from Robert E Feinstein, MD. (29).

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