Determinants of perceived stress and depression among graduating pharmacy students in Metro Manila, Philippines

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ABSTRACT

Objectives. The pharmacy program's academic requisite of comprehensive examinations, academic workload, and internship workload may be significant factors that increase the risk of perceived stress and depression among students. However, further investigation of these stressors focusing on graduating pharmacy students is still insufficient. Hence, we aimed to examine the factors associated with perceived stress and depression among the said population.

Methodology. We conducted a cross-sectional study among 310 graduating pharmacy students in Metro Manila, Philippines. Students were chosen through snowball sampling and recruited in person or on social media. We used the 10-item Perceived Stress Scale to measure perceived stress and the 9-item Patient Health Questionnaire to assess depression. We used linear regression to examine the factors associated with perceived stress and logistic regression to examine the factors associated with depression.

Results. In this study, only academic workload was positively associated with perceived stress. Better comprehensive examination (exam) performance was associated with a reduced risk of moderate to severe depression (AOR = 0.79; 95% CI = 0.71, 0.89), whereas greater academic workload was associated with an increased risk of moderate to severe depression (AOR = 1.11; 95% CI = 1.05, 1.17). None of the sociodemographic factors were associated with perceived stress and depression.

Conclusion. Greater academic workload is associated with increased perceived stress and risk of depression among graduating pharmacy students. On the other hand, better

comprehensive exam performance is associated with a reduced risk of depression. Efforts to improve academic workload and comprehensive exam performance are warranted to help protect the mental health of graduating pharmacy students.

INTRODUCTION

Mental health conditions are a major public health problem worldwide, with depression and anxiety being two of the most common conditions. According to the World Health Organization (WHO), approximately 20% of adolescents suffer from mental health disorders, which make them vulnerable to educational difficulties, physical health problems, and social exclusion. The Global School-based Student Health Survey recorded that mental health disorders such as depression and anxiety are prevalent among Filipinos (WHO 2015).

College students are at increased risk for mental health disorders. Stress is a common problem for them since they are expected to consume and integrate knowledge and skills which in turn makes them susceptible to this state. Although factors contributing to stress vary significantly depending on the conditions experienced by an individual, some factors may seem definite stressors for the students. A longitudinal study in China showed that college students often experienced stress and depressive symptoms (Wang et al. 2020). Leading causes included academic factors such as school performance, examinations (exams), assignments, academic rankings, and test scores, as well as interpersonal factors such as professor-student relationships (Fawzy and Hamed 2017). A cross-sectional study in the Philippines revealed that academic workload influenced the stress of college students due to its demanding nature (Alipio 2020). Written quizzes and exams were also contributing factors to academic stress among college students (Surla et al. 2019). Students feel nervous and uneasy during exams because the human brain perceives them as a threat (Juan et al. 2018). Another study from the Philippines showed that internship programs can lead to stress among college students due to heavy workloads and extended duty hours (Azila-Gbettor et al. 2022). These factors can be especially challenging for graduating students. Studies have yet to be conducted among pharmacy students, particularly graduating students, who may experience heavier academic workloads.

In the Philippines, institutions have incorporated comprehensive exams and internship programs. Comprehensive exams are defined as refresher courses containing summative assessments for a pharmacy or any board program student. They were incorporated into the curriculum to help students prepare for the licensing test (Gabasa and Raqueño 2021). Internship programs are also a requirement in the Philippine education curriculum. Students must complete a 160–200-hour minor training and a 300-360-hour major training to gain practical skills (Carrido et al. 2016). Moreover, comprehensive exams and internship programs are usually included in the last two semesters of pharmacy school.

Although academic-related factors have been studied as possible influences on student mental health, the relationship between comprehensive exams, academic workload, and internship programs to pharmacy students' perceived stress and depression has been understudied. Therefore, this study aimed to examine the factors associated with perceived stress and depression among graduating pharmacy students in Metro Manila.

MATERIALS AND METHODS

Study design and area
The study was conducted using a school-based cross-sectional design. Participants were recruited using snowball sampling and were restricted to PACOP- and non-PACOP-accredited pharmacy schools in Metro Manila, Philippines, with closely matched pharmacy curricula.

Recruitment procedure
Two recruitment procedures were used in this study. The first recruitment method involved posting invitation flyers to pharmacy groups on Facebook. The flyers contained a link and QR code to the consent form and survey questionnaire. We also coordinated with the pharmacy schools and their respective Junior Philippine Pharmacists' Associations (JPPhAs). The JPPhAs helped us disseminate the invitation flyers via Messenger to eligible and willing students. None of the students in the study had previously met or interacted with the researchers.

Participants
Inclusion criteria were pharmacy schools in Metro Manila, in which graduating pharmacy students, whether regular or irregular, were taking comprehensive exams while having their internships. Exclusion criteria were pharmacy students in a post-graduate degree program and those who refused to participate or were not enrolled in the BS pharmacy program. The sample size calculation was based on a previous study conducted in the Philippines that investigated the perceived stress and depression of selected online college students (Canillo et al. 2022). Using OpenEpi, the minimum sample size calculated was 249 respondents, with the following parameters: 80% power, 95% confidence interval, and 10% dropout rate. The initial data collection reached 334 respondents, but after data cleaning and cross-checking with the exclusion criteria, 310 was the final analytic sample.

Variables and measures
Before data collection, a face validity testing of the survey questionnaire with two mental health experts (one psychologist and one psychometrician) was conducted. After face validity testing, pre-testing among 30 pharmacy students was performed, followed by cognitive interview to ensure the reliability of the scales. Those who participated in the pre-testing were excluded from the study.

Outcome variable: Perceived stress
The Perceived Stress Scale (PSS) contains ten items that measure the degree to which situations in one's life are appropriate as stressful (Cohen and Williamson 1988). The scale was used to assess the graduating pharmacy students' perceived stress. It consists of a five-point Likert scale from never (0) to very often (4). To obtain the total PSS-10 score, raw scores were added (the higher the score, the higher the perceived stress). The scores for items 4, 5, 7, and 8 were reverse-coded. Reliability was good (Cronbach's alpha = 0.74).

Outcome variable: Depression
Patient Health Questionnaire (PHQ) is a nine-item self-reported assessment tool that measures the severity of depression (Sons et al. 2020). It consists of a four-point Likert scale ranging from not at all (0) to nearly every day (3) (Yusefzadeh et al. 2019). Scores range from 0-27, with 0-14 being interpreted as minimal depression and 15 and above as moderate to severe depression, meaning higher scores correspond to higher severity of depression (Beard et al. 2016). Reliability was very good (Cronbach's alpha = 0.90).

Comprehensive examination performance

A self-constructed questionnaire was used to evaluate the students' comprehensive exam performance. In the pre-testing, students reported that the comprehensive exam was a major source of stress and anxiety. Therefore, a 10-point Likert scale survey was integrated to assess comprehensive exam performance. This type of survey is often used to measure subjective attitudes and perceptions. Responses ranged from 0 (the worst) to 10 (the best). Higher scores indicated better comprehensive exam performance. Students were asked to assess their comprehensive exam performance on a scale of 0 to 10.

Academic workload

During the pre-testing, the academic workload (i.e., assignments, quizzes, and activities) was identified as another determinant that affects the students' mental health aside from their comprehensive exams. A self-constructed survey questionnaire was used: "On a scale of 0 to 10, 10 being the highest, how would you assess your academic workload?". It consists of a 10-point Likert scale, with 0-2 as extremely good, 3-4 as very good, 5 for good, 6-7 for not bad, 8-9 as bad, and 10 for worst.

Internship workload

The internship workload of the students was assessed by giving them a self-constructed survey questionnaire consisting of a single question: "On a scale of 0 to 10, 10 being the highest, how would you assess your internship workload?" The response options to this question were the same as the response options for the question about academic workload.

Sociodemographic characteristics

Sociodemographic characteristics were based on a previous study (Baumann et al 2021) and included age, sex, living conditions, and working status.

Data analysis

Descriptive statistics were conducted to summarize the sociodemographic characteristics of graduating pharmacy students. Linear regression analysis was used to examine the association between the exposure variables and perceived stress. Logistic regression analysis was utilized to examine the factors associated with depression. All models were clustered by school. The level of significance was set to p-value < 0.05 (two-tailed). STATA software version 14.2 (StataCorp, College Station, TX, USA) was used for various data analyses.

Ethical considerations

The ethical approval was obtained from Adamson University's University Ethics Review Committee (2022-02-PHA-05). Students provided written informed consent and participated voluntarily. The study's aim was stated on the survey form, and anonymity was guaranteed. The confidentiality of personal data, information, and responses was strictly protected.

RESULTS AND DISCUSSION

Characteristics of participants

Table 1 shows the sociodemographic characteristics of 310 graduating pharmacy students. Most students were in the age group of 20-22 (77.1%). The majority were female (82.6%) and not working (92.3%). Most were living with others (88.7%). The mean comprehensive exam performance of the students was 6.35 (SD [Standard Deviation] 2.09). The mean academic workload was 4.99 (SD 2.33). The mean internship workload was 4.15 (SD 2.16). The mean perceived stress of the students was 20.75 (SD 2.46). A little over half were at risk for minimal depression (51.6%). The rest were at risk for moderate to severe depression (48.4%)

Table 1: Sociodemographic characteristics of graduating pharmacy students in Metro Manila, Philippines (n = 310)

Characteristics	n	%
Sociodemographic		
Age		
20-22	239	77.1
23-30	71	22.9
Sex		
Male	54	17.4
Female	256	82.6
Working Status		
Working student	24	7.7
Not a working student	286	92.3
Living Arrangement		
Living alone	35	11.3
Living with others	275	88.7
Academic-related factors		
Comprehensive exam performance, mean (SD); range: 1-10	6.25 (2.09)	
Academic workload, mean (SD); range: 1-10	4.99 (2.33)	
Internship workload, mean (SD); range: 1-10	4.15 (2.16)	
Mental health		
Perceived stress, mean (SD); range: 0-40	20.75 (2.46)	
Depression		
Minimal depression	160	51.6
Moderate to severe depression	150	48.4

SD, standard deviation.

Factors associated with the perceived stress of the graduating pharmacy students

Table 2 shows the factors associated with perceived stress among graduating pharmacy students. Only academic workload (B [unstandardized beta] = 0.11; 95% CI [Confidence Interval] = 0.00, 0.22) was found to be positively associated with perceived stress, indicating that a higher academic workload corresponds to more significant perceived stress. The results showed that a 1-unit increase in academic workload corresponds to a 0.11-unit increase in perceived stress.

Table 2: Factors associated with the perceived stress of the graduating pharmacy students in Metro Manila, Philippines (n = 310)

	Unadjusted		Adjusted	
	B (95% CI)	p-value	B (95% CI)	p-value
Comprehensive exam performance	0.08 (-0.16, 0.31)	0.507	0.11 (-0.16, 0.38)	0.385
Academic workload	0.02 (-0.08, 0.11)	0.689	0.11 (0.00, 0.23)	0.047
Internship workload	-0.06 (-0.15, 0.03)	0.179	-0.11 (-0.28, 0.05)	0.163
Age (vs 20 to 22)				
23 to 30	-0.23 (-1.08, 0.62)	0.569	-0.28 (-1.05, 0.48)	0.440
Sex (vs. female)				
Male	-0.31 (-1.23, 0.61)	0.485	-0.32 (-1.30, 0.65)	0.490
Working status (vs. Non-working)				
Working	0.81 (-0.11, 1.73)	0.080	0.91 (-0.17, 2.00)	0.092
Living arrangement (vs. Living with others)				
Living alone	0.18 (-0.89, 1.25)	0.724	0.09 (-0.96, 1.14)	0.858

SD, standard deviation; B, unstandardized coefficient; CI, confidence interval.

Medical-related courses, such as pharmacy, have a high course load in lectures and laboratory activities to cover all the necessary material. The heavy course load could have restricted students' leisure time which can reduce academic-induced stress. This finding was consistent with a mixed-method study conducted in Bhutan, which found that as workload increases, students have difficulty managing their time and feel pressured to finish their workload, which can lead to self-doubt (Yangdon et al. 2021). Similarly, a longitudinal study in Ohio highlighted that the higher the perceived stress, the greater the impact on the physiological health of college students (Koch 2018). These disagreed with a study in the United Kingdom, where stress from an increased academic load prompted students to be more productive and achieve high grades (Smith 2019).

Factors associated with moderate to severe depression of graduating pharmacy students

Table 3 shows the factors associated with depression among graduating pharmacy students. Both comprehensive exam performance (AOR [Adjusted Odds Ratio] = 0.79; 95% CI = 0.71, 0.89) and academic workload (AOR = 1.11; 95% CI = 1.05, 1.17) were associated with moderate to severe depression. Students with a heavy academic load were at higher risk for depression, and those with good comprehensive exam performance were at lower risk.

Table 3: Factors associated with the moderate to severe depression of the graduating pharmacy students in Metro Manila, Philippines (n = 310)

	Unadjusted		Adjusted	
	OR (95% CI)	p-value	AOR (95% CI)	p-value
Comprehensive exam performance	0.78 (0.70, 0.86)	<0.001	0.79 (0.71, 0.89)	<0.001
Academic workload	1.15 (1.08, 1.21)	<0.001	1.11 (1.05, 1.17)	0.001
Internship workload	1.06 (0.96, 1.17)	0.238	0.93 (0.79, 1.09)	0.389
Age (vs 20 to 22)				
23 to 30	0.84 (0.62, 1.15)	0.278	0.92 (0.56, 1.50)	0.732
Sex (vs. female)				
Male	1.29 (0.49, 3.42)	0.603	1.45 (0.44, 4.78)	0.545
Working status (vs. Non-working)				
Working	1.29 (0.48, 3.46)	0.619	1.03 (0.36, 2.97)	0.950
Living arrangement (vs. Living with others)				
Living alone	1.15 (0.67, 1.97)	0.620	1.18 (0.58, 2.37)	0.648

SD, standard deviation; OR, odds ratio; AOR, adjusted odds ratio; CI, confidence interval.

Heavy academic workload can be detrimental to students' mental health. Students may not have enough time to prepare for exams, engage in leisure activities, or socialize with relatives. They may also lack adequate sleep. Depression can significantly impact students' mental health, affecting their concentration during exams and their ability to achieve their academic goals. A systematic review conducted in China found similar results, suggesting that greater school exhaustion led to higher levels of academic stress, which in turn increased the risk of depression (Wang et al. 2021). Moreover, a cross-sectional study in Sudan revealed that only high school students' poor academic performance was an influential indicator of their depression. Compared to learners who failed academically, those who performed better on the examinations had a lower risk of developing severe depression (Bashir et al. 2019). Contrary to our findings is a cross-sectional study conducted in the United Kingdom which found that heavy workloads were treated as an

opportunity for students to improve their output, achieve better grades, and have a stronger sense of well-being (Smith 2019).

Good comprehensive exam performance was protective of students' mental health. Our findings showed that it was only associated with depression, not perceived stress. Stress and depression can both affect students physically, mentally, and emotionally, but they manifest differently. Comprehensive exams are typically taken for one or two semesters, and this prolonged stress can lead to depression in students. On the other hand, stress can have varying degrees of impact on students' daily experiences, ranging from mild discomfort to significant impairment. Furthermore, some students may find stress to be beneficial and motivating, while depression is typically not. A longitudinal study in India found that increased stress during exams helped students achieve higher grades (AlFaris et al. 2019). Comprehensive exams related to depression can be

attributed to students experiencing test anxiety when taking an exam due to the fear of doing poorly and repeating the same test. It was consistent with a cross-sectional study in Sudan, where students experienced high levels of test anxiety and depression due to test-related factors. Factors include concerns about not achieving self-expectations and the expectations of parents and teachers. The same study also highlighted that students were psychologically and mentally vulnerable during exams as they experienced exam-related depression (Smith 2019).

CONCLUSION

Students with a greater academic workload had higher levels of perceived stress and depression. Students with better comprehensive exam performance had a lower risk of depression. None of the sociodemographic characteristics were associated with the mental health of graduating pharmacy students.

STRENGTHS AND LIMITATIONS

To the best of our knowledge, this is the first study that examined the mental health of graduating pharmacy students in the Philippines. Recruitment was conducted online and in-person to increase the response rate. Several schools in Metro Manila participated in the survey. However, this study has several limitations. First, depression was only suggestive and not a diagnosis of clinical depression; hence, students at risk for moderate to severe depression require further assessment by mental health professionals. Second, our study only focused on pharmacy schools in Metro Manila, limiting the generalizability of our study findings. Thus, expanding the scope of the study outside Metro Manila will provide new insights. Third, the use of the purposive sampling method was also a limitation since we could not have a complete list of pharmacy students from different schools. Regardless, we have covered both PACOP and non-PACOP accredited pharmacy schools to improve representativeness. Lastly, open recruitment using social media platforms limited the participants to those with open and stable access to the internet. Hence, assistance from the student head of the university's pharmacy organization was sought to widen the dissemination of the survey questionnaires to the pharmacy students.

RECOMMENDATION AND IMPLICATIONS

This study highlighted the importance of improving the student's academic workload in educational institutions. The association of academic workload with perceived stress and depression was relevant to suggest interventions that can improve student's mental health. Since the study focused on pharmacy students, it can help in determining the needs of these students and serve as a basis for future school-based intervention programs. Implementing mental health services such as stress management workshops at universities can help students cope with stress and depression. Other recommendations such as improving the academic load without compromising the quality of learning, tailoring the comprehensive exam and internship program schedules, and establishing academic support groups can also reduce stress and depression among students. Universities and professors must participate in improving academic workload and prioritizing students' mental health. A holistic intervention program should be developed for all pharmacy program students, not just graduating students. Future researchers should conduct qualitative research to explore further the relationship between factors and outcomes, increase the sample size, and expand the study area.

CONFLICT OF INTEREST

All authors have no conflict of interest.

CONTRIBUTIONS OF INDIVIDUAL AUTHORS

The study was conceptualized by AB, KMD, MVG, FM, RRC, KJM, MJM, and LAC. Data curation: AB, KMD, MVG, and FM; formal analysis: AB, MVG, and RRC; sample size computation: KMD; methodology: AB, KMD, MVG, FM, RRC, KJM, and MJM; project administration: AB, KMD, MVG, and FM; supervision: RRC; validation: RRC, KJM, MJM, and LAC; visualization: AB, KMD, MVG, and FM; original draft: AB, KMD, MVG, and FM; review and editing: AB, KMD, MVG, FM, RRC, KJM, MJM, and LAC. All authors critically reviewed and approved the manuscript.

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