BRIEF

Prevalence of Anxiety and Depressive Symptoms Among Pharmacy Students

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Objective. To explore and compare the prevalence of anxiety and depressive symptoms between first-, second-, and third-year pharmacy students.

Methods. A repeated-measures study was conducted at two campuses (main and satellite) of the University of Arizona College of Pharmacy. A survey was administered in February 2019 and again in April 2019 during mandatory courses for first-, second-, and third-year Doctor of Pharmacy students to collect seven-item Generalized Anxiety Disorder (GAD-7) scores, nine-item Patient Health Questionnaire (PHQ-9) scores, and demographic information. A chi-square test with a Bonferroni correction was performed to compare the number of students in a class year with clinically significant symptoms, defined as scores of ≥ 10 for both the GAD-7 and PHQ-9.

Results. The survey response rate was 82%. Thirty percent of students self-reported having clinically significant anxiety symptoms and 22% of students self-reported having clinically significant depressive symptoms. More second-year pharmacy students self-reported anxiety and depressive symptoms as the semester progressed.

Conclusion. About one in four pharmacy students self-reported clinically significant symptoms of anxiety and depression, and more second-year pharmacy students reported anxiety and depressive symptoms later in the semester. These findings support the need for optimizing the delivery of well-being resources to pharmacy students.

Keywords: depression, anxiety, prevalence, pharmacy students

INTRODUCTION

Depression and anxiety disorders are common in the United States.^{1,2} The most recent National Institute of Mental Health (NIMH) data available from 2017 estimates that about 7% of US adults experienced one major depressive episode or more in the past year, and other data show that one in three adults experience an anxiety disorder in their lifetime.^{1,2} In 2017, the highest prevalence of depression was among adults aged 18-25 years and the highest rate of anxiety was among adults aged 18-29 years.^{1,2} People with depression or anxiety may experience reduced functioning in school, sleep, and cognitive focus.^{1,2} In addition, the Centers for Disease Control and Prevention (CDC) reports that since 1999, suicide rates have progressively increased in 49 out of 50 states.³ Based on results from the 2019 National Survey on Drug Use and Health (NSDUH), the prevalence of serious suicidal thoughts and suicide attempts in 2019 was also highest among adults aged 18-25 years.⁴ Because this is the most

common age group of students enrolled in US colleges and universities, it is important for campuses to be prepared to provide care and resources to students who may be struggling with functional impairments resulting from depression and/or anxiety.⁵

The average age of students entering the University of Arizona College of Pharmacy is 25 years, which falls within the age ranges with the highest rates of anxiety and depression.^{1,2,6,7} These students are likely at an increased risk of impairment in their schoolwork, job performance, or personal relationships due to depressive and anxiety symptoms.^{1,2} To tackle this issue, pharmacy organizations such as the American Association of Colleges of Pharmacy (AACP) encourage colleges of pharmacy to proactively promote wellness and stress management techniques to students.⁸ Results from a nationwide survey conducted in 2015 and 2016 found that almost 40% of pharmacy residents self-reported symptoms of moderate-to-severe depression, with symptoms worsening as time progressed in the residency year.⁹ This study demonstrated depressive symptoms are common among pharmacy trainees; therefore, similar studies are needed for pharmacy students.

Because pharmacy students are often under a significant amount of stress, they are at risk of developing

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anxiety and depressive symptoms that can impede their ability to perform successfully.¹⁰ Thus, to help pharmacy students be successful, it is important to evaluate the extent of this problem. The purpose of this study was to explore and compare the prevalence of anxiety and depressive symptoms between first-, second-, and third-year Doctor of Pharmacy (PharmD) students at the University of Arizona College of Pharmacy.

METHODS

This study was approved by the University of Arizona Human Subjects Protection Program. The college of pharmacy has a main campus and satellite campus located in different cities. At the time of the study, the class size for the main campus ranged from 82 to 98 students, while the satellite campus ranged from 25 to 39 students.

This was a repeated-measures study. The same survey was administered in-person during a mandatory class for first-, second-, and third-year students in February 2019 and again in April 2019. The survey was administered twice to assess whether students' overall anxiety and depressive symptom score changed as the semester progressed. Each student was provided with an anonymous, unique identifier code, which they were supposed to record and report on the second administration of the survey. Although we initially aimed to match individual responses anonymously, this method was abandoned because some students did not record or report their identifier code. Surveys were administered in written form and manually entered into a password-protected data sheet.

Students were eligible to participate if they were at least 18 years old and enrolled at the University of Arizona College of Pharmacy as first-, second- or third-year pharmacy students. Students were not required to participate, and they did not receive a grade or credit for participation. No make-up survey was provided if a student was not in attendance for administration of either the initial or follow-up survey. Responses were included in the analysis if the student participated in one of the two surveys.

The survey consisted of the seven-item Generalized Anxiety Disorder (GAD-7) to assess anxiety symptoms, the nine-item Patient Health Questionnaire (PHQ-9) to assess depressive symptoms, and 12 questions pertaining to demographic information and lifestyle behaviors related to well-being. Anxiety and depressive symptoms were defined as clinically significant if the participant had a score of 10 or more on the GAD-7 or PHQ-9, respectively.^{9,11-14}

The GAD-7 and PHQ-9 are instruments that help classify symptom severity and aid practitioners in diagnosing anxiety and depression, respectively.^{11,12} Patients

reflect on symptom frequency over the previous two weeks and select a response on a Likert scale of zero (not at all) to three (nearly every day) for both instruments.^{11,12} The GAD-7 has seven items, and severity is categorized as mild, moderate, and severe based on scores of 5-9, 10-14, and 15-21, respectively.¹¹ For generalized anxiety disorder, the GAD-7 has demonstrated 89% sensitivity and 82% specificity.^{11,13} The PHQ-9 has nine items, and severity is categorized as mild, moderate, moderately severe, and severe based on scores of 5-9, 10-14, 15-19, and 20-27, respectively.¹² For major depressive disorder, the PHQ-9 has demonstrated 88% sensitivity and 88% specificity.^{12,14}

The prevalence of clinically significant symptoms for each class year were reported as frequencies. A chi-square test with a Bonferroni adjusted alpha of .016 was used to compare the prevalence of clinically significant anxiety and depressive symptoms across time for each class cohort. Statistical analysis on demographic data was not performed because survey matching for each participant was not possible.

RESULTS

A total of 596 survey instruments were completed over both administrations, with 304 participants in February 2019 and 292 participants in April 2019. The response rates for February and April were 84% and 80%, respectively. Demographic and lifestyle characteristics stratified per class year are shown in Table 1. Across all class years, 30% of students reported clinically significant anxiety symptoms and 22% of students reported clinically significant depressive symptoms (Table 2).

The number of students in each class year with clinically significant anxiety and depressive symptoms are shown in Table 3. More second-year pharmacy students experienced clinically significant anxiety symptoms ($GAD-7 \geq 10$) in April 2019 compared to February 2019 ($\chi^2 = 8.16$, $p = .01$). More second-year pharmacy students experienced clinically significant depressive symptoms ($PHQ-9 \geq 10$) in April compared to February ($\chi^2 = 11.82$, $p = .01$). There was no significant difference in the proportion of students who experienced clinically significant anxiety and depressive symptoms across time for first- and third-year pharmacy students ($p > .016$).

DISCUSSION

Our study found that about one in four pharmacy students enrolled in the didactic curriculum at a South-western college of pharmacy self-reported symptoms of anxiety and depression that were considered moderate to severe. The number of second-year pharmacy students

Table 1. Self-Reported Demographic and Lifestyle Characteristics of Doctor of Pharmacy Students Who Completed Surveys to Identify Anxiety and Depressive Symptoms

Variable	First-Year Students (N=224) ^{a,b,c,d}	Second-Year Students (N=210) ^{a,b,c,d}	Third-Year Students (N=148) ^{a,b,c,d}
Campus, %			
Main campus	73	69	72
Satellite campus	27	31	28
Sex, %			
Female	56	71	60
Male	44	29	40
Age range, %			
18-25	71	64	43
26-33	20	28	47
34+	10	8	10
Anxiety diagnosis, %			
Anxiety diagnosis	12	22	22
No diagnosis	88	78	78
Depression diagnosis, %			
Depression diagnosis	8	13	11
No diagnosis	92	87	89
Current treatment for anxiety and/or depression, %			
Yes	8	18	14
No	6	9	14
Not applicable	86	74	72
Binge drinking, %			
Never	38	35	41
Once per year	12	30	32
Once per month	34	26	14
Every other week	8	5	8
Once a week	7	4	3
More than once a week	1	0	1
Average number of alcoholic drinks consumed per weekend, mean (SD)	1.9 (2.7)	1.4 (1.9)	1.5 (2.5)
Average number of hours of exercise per week, mean (SD)	3.6 (4.1)	3.3 (3.1)	3.7 (5.1)
Average number of hours of sleep per night, mean (SD)	6.0 (1.3)	6.7 (5.4)	6.9 (2.2)

^a N=number of surveys returned in February and April 2019 for that class year unless otherwise specified

^b Percentages may not total 100 because of rounding

^c Data were excluded if demographic and lifestyle questions were left blank

^d First-year students=class of 2022, second-year students=class of 2021, third-year students=class of 2020

who reported clinically significant anxiety and depressive symptoms was significantly higher later in the semester.

This study evaluated the prevalence of anxiety and depressive symptoms solely in pharmacy students, and our findings are fairly consistent with previous studies conducted among health science graduate students. Mazurek Melnyk and colleagues evaluated the relationship between physical health, lifestyle behaviors, and mental health among incoming first-year health science graduate students at a large Midwestern university.¹⁵ Based on PHQ-9 and GAD-7 scores, 41% of those

students had depressive symptoms and 28% had anxiety symptoms.¹⁵ In a separate study, Fischbein and Bonfine assessed the prevalence of clinically significant depressive and anxiety symptoms in medical and pharmacy students using the PHQ-9 and GAD-7.¹⁶ For depression, 19% of the pharmacy students and 18% of the medical students reported clinically significant symptoms.¹⁶ For anxiety, 21% of the pharmacy students and 11% of the medical students reported clinically significant symptoms.¹⁶ Our study and the current literature confirm that it is common for pharmacy and other health graduate students to

Table 2. Overall Prevalence of Clinically Significant Anxiety and Depressive Symptoms Reported by Doctor of Pharmacy Students Who Completed a Diagnostic Survey Instrument at Two Time Points

Clinically Significant Symptoms	February Survey (N=304), %	April Survey (N=292), %	Combined Surveys (N=596), %
Clinically significant anxiety symptoms ^a	28	32	30
Clinically significant depressive symptoms ^b	19	25	22

Abbreviations: GAD-7=Generalized Anxiety Disorder, PHQ-9=Patient Health Questionnaire

^a Clinically significant anxiety symptoms defined as a GAD-7 score of 10 or higher

^b Clinically significant depressive symptoms defined as a PHQ-9 score of 10 or higher

experience clinically significant symptoms of depression and anxiety. Therefore, administrators of health science graduate programs should strive to ensure adequate provision of mental health resources for students.

Another recent survey of 30,725 undergraduates and 15,346 graduate students was conducted in 2020 across nine public universities during the COVID-19 pandemic. This survey used the PHQ-2 and GAD-2 to assess mental health, which are shortened versions of the surveys used in our study. For graduate students, 32% reported symptoms of major depression and 39% reported symptoms of generalized anxiety disorder.¹⁷ Our data were collected before the COVID-19 pandemic and yielded only slightly lower rates for anxiety and depressive symptoms. This highlights how it will be important for universities to continue working on strategies to help students cope with these symptoms in the future.

Williams and colleagues evaluated the prevalence of clinically significant depressive symptoms (defined as a PHQ-9 score of 10 or higher) among pharmacy residents from 2015-2016.⁹ Rates of clinically significant depressive symptoms ranged from 34% to 40% at three time points during the residency year.⁹ Our study detected rates of clinically significant depressive symptoms ranging from 14% to 23% in third-year pharmacy students, which were lower than the values seen in the study by Williams and

colleagues. Depressive and anxiety symptoms were not measured among fourth-year pharmacy students as these students were completing pharmacy practice experiences and not available to participate in an in-person survey. Our findings suggest that depressive symptoms may begin prior to pharmacy residency training and support the need to tackle this issue during pharmacy school.

Knowing the prevalence of anxiety and depressive symptoms in pharmacy students is important as these can negatively impact academic performance. For example, the 2019 National College Health Assessment reported that about 28% and 20% of students felt that their anxiety and depression negatively affected their academic performance. Also, Eisenberg and colleagues found that anxiety and depression resulted in a significant drop in grade point average (GPA).^{18,19} Anxiety and depression have also been shown to influence work performance.^{20,21} Because our findings demonstrate that a significant proportion of pharmacy students suffer from symptoms of anxiety and depression, future studies should aim to investigate the impact this may have on pharmacy students' academic and work performance.

There were several limitations to this study. The study was only conducted at one college of pharmacy; thus, the results are not generalizable to other pharmacy schools. Data were only collected during one semester of

Table 3. Prevalence of Clinically Significant Anxiety and Depressive Symptoms in Doctor of Pharmacy Students

	First-Year Students (N=227) ^{a,b}	Second-Year Students (N=214) ^{a,b}	Third-Year Students (N=155) ^{a,b}
Anxiety symptoms, ^c % (n)			
February	30 (n=115)	24 (n=105)	32 (n=84)
April	29 (n=112)	42 (n=109) ^{e,f}	20 (n=71)
Depressive symptoms, ^d % (n)			
February	21 (n=115)	15 (n=105)	23 (n=84)
April	22 (n=112)	36 (n=109) ^{e,f}	14 (n=71)

^a N=number of surveys returned in February and April 2019 for that class year unless otherwise specified

^b First-year students=class of 2022, second-year students=class of 2021, third-year students=class of 2020

^c Clinically significant anxiety symptoms defined as a GAD-7 score of 10 or higher

^d Clinically significant depressive symptoms defined as a PHQ-9 score of 10 or higher

^e Significant *p*-value for a 2x2 Chi-square test (*p*<.016)

^f Significance was determined with a Bonferroni adjusted alpha of .016

the four-year curriculum; therefore, we were unable to determine changes in the prevalence of reported anxiety and depressive symptoms as students progressed through the PharmD curriculum. Some pharmacy students reported a previous diagnosis of anxiety/depression from a medical professional with or without treatment. This may have resulted in misclassification of underlying symptoms because current treatment and diagnosis were not used to stratify significant survey scores. Finally, our study did not include fourth-year pharmacy students completing their advanced pharmacy practice experiences (APPEs); therefore, we were unable to compare the prevalence of anxiety and depressive symptoms between students enrolled in the didactic curriculum vs those completing APPEs. Future studies should assess the impact of anxiety and depressive symptoms on academic and work performance. Given that our findings highlight the need for interventions that will improve symptoms of depression and anxiety in pharmacy students, future studies should also assess the impact of delivering specific well-being resources on these symptoms.

CONCLUSION

One in four PharmD students at a Southwestern college of pharmacy reported moderate to severe symptoms of depression and anxiety. These findings highlight the importance of optimizing the delivery of well-being resources to pharmacy students and can increase awareness of the prevalence of anxiety and depressive symptoms among this group. Results of the study were presented to the college's Wellness Committee as a means of opening a dialogue on ways to improve student wellness. Future studies should investigate the impact of interventions designed to improve pharmacy students' mental health and well-being.

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