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Currents in Pharmacy Teaching and Learning 15 (2023) 34–42

Contents lists available at ScienceDirect

Currents in Pharmacy Teaching and Learning

journal homepage: www.sciencedirect.com/journal/currents-in-pharmacy-teaching-and-learning

Research Note

Identifying predictors of generalized anxiety among student pharmacists in response to the COVID-19 pandemic

Rania El-Desoky [a], Austin De La Cruz [a], J. Douglas Thornton [b], Matthew A. Wanat [c], Divya Varkey [d,*]

[a] University of Houston College of Pharmacy, Health 2, 4349 Martin Luther King Blvd Room 4349, Houston, TX 77204, United States
[b] University of Houston College of Pharmacy, Health 2, 4349 Martin Luther King Blvd Room 4055, Houston, TX 77204, United States
[c] Prescription Drug Misuse Education & Research (PREMIER) Center University of Houston College of Pharmacy, Health 2, 4349 Martin Luther King Blvd Room 4029, Houston, TX 77204, United States
[d] Pharmacy Leadership and Administration, University of Houston College of Pharmacy, Health 2, 4349 Martin Luther King Blvd Room 4027, Houston, TX 77204, United States

ARTICLE INFO

Keywords:
Anxiety
Assessment
COVID-19
Pharmacy
Student

ABSTRACT

Introduction: To explore the prevalence of generalized anxiety (GA) among doctor of pharmacy (PharmD) students at an academic institution during the COVID-19 pandemic and use Alderfer's existence, relatedness, and growth (ERG) theory to elucidate which unsatisfied needs are predictive of higher levels of GA symptoms.

Methods: This was a cross-sectional, single-site survey administered to first- through fourth-year PharmD students from October 2020 to January 2021. The survey tool included demographic information, the validated Counseling Center Assessment of Psychological Symptoms-62 tool, and nine additional questions developed to assess Alderfer's ERG theory of needs. Predictors of GA symptoms were evaluated using descriptive statistics, multiple linear regression, correlation analysis, and multivariable analysis.

Results: A total of 214 of 513 students completed the survey (42%) . Among students, 49.01% had no-clinical, 31.31% had low-clinical, and 19.63% had high-clinical GA symptoms. The relatedness needs, which included feeling disliked, socially disconnected, and misunderstood had the strongest correlation (65%) to GA symptoms and was most associated with GA symptoms ($\beta = 0.56$, $P < .001$). Students who did not exercise experienced more symptoms of GA ($P = .008$).

Conclusions: Over 50% of PharmD students met clinical cut-offs for GA symptoms and the relatedness need was most predictive of GA symptoms among students. Future student-centered interventions should aim to create opportunities that increase social connections, build resilience, and provide psychosocial support.

Introduction

Rising mental health concerns among students requires universities to be more prepared to support the needs of this vulnerable population. Compared to other professions, health profession students are often under a significant amount of stress due to

* Corresponding author.
E-mail addresses: reldesok@uh.edu (R. El-Desoky), aidelacruz@uh.edu (A. De La Cruz), jdthornt@central.uh.edu (J.D. Thornton), mawanat@uh.edu (M.A. Wanat), davarkey@central.uh.edu (D. Varkey).

https://doi.org/10.1016/j.cptl.2023.02.005

Available online 28 February 2023

academically and emotionally demanding programs.[1–3] In addition, anxiety has disproportionately affected students in health professions and warrants attention due to its significant implications.[1–3] There are devastating consequences of anxiety on students' learning, psychological well-being, ability to provide patient care, and progression throughout their career.[1,4,5] Student pharmacists in particular, are more likely to have anxiety and less likely to seek help from student counseling services compared to medical students.[6] In efforts to decrease student stress and anxiety, the American Association of Colleges of Pharmacy encourages pharmacy schools to promote positive well-being and resilience among students.[5] Many schools have implemented programs to aid students in coping with mental health illnesses, however, the need for augmented and more focused interventions are dire since the COVID-19 pandemic has introduced new stressors.

Since the outbreak of COVID-19, college students face new adversities due to many uncertainties and changes. Along with the fear of contracting the virus, students have had to adjust to mitigation measures in place including hybrid learning models, virtual social gatherings, social distancing, and masking as recommended by the Centers for Disease Control and Prevention.[7] Students have been faced with displacement from housing, financial instability, loss of support, and concern about their academic performance since shifting to online instruction.[4,8] These factors have had a direct impact on college students overall psychological well-being. A study conducted by Daniels et al.[8] at Georgetown University in 28 countries found that 79% of college students reported feeling "much worse" or "worse" since the COVID-19 pandemic due to increased anxiety, stress, and uncertainty.[8,9] Wang and Zhao[10] found levels of anxiety among college students in China were significantly higher than national average amidst the COVID-19 pandemic. Limited studies have explored the needs and mental health impact of student pharmacists amidst the COVID-19 pandemic. It is crucial to explore mental health and needs in this vulnerable population during the COVID-19 pandemic utilizing a validated mental health scale.

Meeting student perceived psychological needs facilitates academic achievement. Identifying those needs is critical so academic institutions can provide the necessary resources and programs to support their students. Previous studies examining needs of students during the COVID-19 pandemic did not use a theoretical framework, a blueprint that provides a foundation for the research design and analysis.[11] Alderfer's[12] motivational theory provides a theoretical framework that suggests humans are motivated by three categories of needs: existence, relatedness, and growth (ERG). Existence needs include material needs like food, shelter, safety, and prevention of anxiety or fear, as well as physiological needs that include sleep, exercise, and self-care time. The pandemic has led to economic uncertainty, and many are struggling to obtain basic material needs.[8] Alderfer's[12] relatedness need encompasses a sense of belonging and interpersonal relationships for security. With a transition to online learning and social distancing restrictions, students may feel disconnected from their classmates during a time where social support is needed the most. Significant increases in loneliness among young adults have been observed since the start of the COVID-19 pandemic, with effects that resonate to increased mental distress causing spikes in depression and anxiety.[13,14]

Finally, growth encompasses self-esteem and self-actualization needs through personal achievement, which can include pursuing knowledge and gaining competence and confidence. The ERG theory does not suggest a hierarchy, rather humans may be trying to achieve many different needs on more than one level simultaneously.[12,15,16] Students are facing new threats to their ERG needs during the COVID-19 pandemic, which may be directly impacting their mental health.

The primary objective of this study is to examine the prevalence of generalized anxiety (GA) symptoms among student pharmacists at an academic institution during the COVID-19 pandemic, using the validated Counseling Center Assessment of Psychological Symptoms-62 (CCAPS-62) survey. A secondary objective is to elucidate which category of Alderfer's[12] needs among ERG is most associated with higher symptoms of anxiety, in addition to identifying predictors of GA symptoms. These findings will help make informed decisions that serve as the groundwork for interventions to address the needs of student pharmacists in efforts to decrease levels of GA.

Methods

This study was a cross-sectional, single-center, survey conducted from October 2020 to January 2021; approximately seven to 10 months after COVID-19 was recognized as a global pandemic. This study was approved by the institutional review board at the college of pharmacy (COP). Students who were enrolled in a four-year doctor of pharmacy (PharmD) program during the 2020–2021 academic school year were invited to participate in the study and all surveys completed between October 2020 to January 2021 were included in the analysis. At the time this study was conducted, the COP mandated that all classes be conducted in a virtual format, except for sterile products laboratory (lab), which followed a hybrid format and had on-campus days approximately once a week for six weeks. In addition, some advanced pharmacy practice experiences transitioned to a virtual format while others remained in person.

The survey was distributed to 513 students through Qualtrics (Qualtrics), an online survey tool. Personalized links were distributed to avoid students completing the survey on multiple occasions. Students were reminded to complete the survey by utilizing class Facebook (Meta Platforms) and learning management system announcements, verbal announcements at virtual student organization and class events, and redistributing personalized links via Qualtrics to students who have not completed the survey. Student confidentiality was maintained throughout this process by de-identifying all data prior to analysis.

The survey included demographic data (e.g., gender, ethnicity, current standing in the PharmD curriculum, marital status), in addition to questions regarding employment status and how often they exercise. The survey assessed student mental health through the validated CCAPS-62 mental health survey. The 10-min validated CCAPS-62 survey instrument was developed by the University of Michigan Counseling & Psychological Services Center to measure college students' mental health. The CCAPS-62 helps identify risks associated with generalized and social anxiety, depression, eating concerns, substance use, hostility, family distress, and academic distress.[17] The CCAPS-62 survey includes a series of statements and students are to select how each statement pertains to them in the

past two weeks using a five-point Likert-type scale of 0 to 4 (0 = not at all like me to 4 = extremely like me). Nine of the 62 questions included in the CCAPS-62 survey are designed to assess GA symptoms and will be referred to as the GA subscale questions throughout this paper. For the purpose of this study, the GA subscale questions were used to assess GA symptoms among students. In addition, select questions from the CCAPS-62 survey were linked to the Alderfer's[12] ERG theory. Furthermore, nine additional survey questions formulated by the authors of this manuscript were added to the end of the CCAPS-62 survey to holistically assess student needs that may have not been captured solely through the select questions included in the CCAPS-62 survey (Table 1). It is important to note, that the CCAPS-62 questions were not altered or re-worded for the purpose of this study. All questions formulated by the authors based on Alderfer's[12] ERG categories were answered on a five-point Likert scale that ranged from 0 to 4 (0 = strongly disagree to 4 = strongly agree) for consistency with the CCAPS-62 survey.

To assess symptoms of GA, a mean score was calculated based on nine questions included in the GA subscale questions from the CCAPS-62 clinical tool. A score of zero indicates no symptoms of GA and a score of 4 indicates high symptoms of GA. The CCAPS-62 tool has cut-off scores to interpret results into clinical practice. The cut-off scores divide the GA symptoms subscale into three ranges of distress classified as low, moderate, and elevated with mean GA scores $\leq$1.22, 1.23 to 1.88, and $\geq$ 1.89, respectively.[18] These cut points were established based on a large normative sample of approximately 260,000 students in the United States (US) who have contributed to the data.[18] The low, also known as "no-clinical," group consists of students who report no or minimal distress. The moderate, also

Table 1
Student pharmacists' reponses to CCAPS-62 generalized anxiety, ERG questions.[a]

Survey item	Mean (SD)
CCAPS-62 Generalized Anxiety Subscale Questions	
There are many things I am afraid of[b]	1.75 (1.15)
My heart races for no good reason[b]	1.21 (1.18)
I am anxious that I might have a panic attack while in public[b]	0.79 (1.19)
I have sleep difficulties[b]	1.47 (1.37)
My thoughts are racing[b]	1.68 (1.36)
I have spells of terror or panic[b]	0.84 (1.25)
I feel tense[b]	1.76 (1.35)
I am easily frightened or startled[b]	1.18 (1.24)
I experience nightmares or flashbacks[b]	0.83 (1.56)
Composite Generalized Anxiety Score	1.28 (0.71)
ERG Existence Questions	
I am concerned about personally contracting COVID-19 on campus even with current safety guidelines in place that recommend social distancing, frequent hand washing, and adherence to masks[c]	2.14 (1.33)
My financial situation has become more stressful since the COVID-19 pandemic[c]	2.27 (1.23)
I am having difficulty obtaining basic needs which may include food, housing, job, and/or medical care since the COVID-19 pandemic[c]	1.26 (1.16)
Composite ERG Existence Score	1.89 (0.95)
ERG Relatedness Questions	
I make friends easily[b,d]	1.73 (1.14)
I am concerned that other people do not like me[b]	1.45 (1.31)
I feel self-conscious around others[b]	1.67 (1.37)
I feel comfortable around other people[b,d]	1.87 (1.13)
I feel that I have no one who understands me[b]	0.98 (1.24)
I feel disconnected from people I care about[c]	1.85 (1.28)
My social interaction with people I care about has decreased due to the COVID-19 pandemic[c]	2.93 (1.13)
Composite ERG Relatedness Score	1.78 (0.79)
ERG Growth Questions	
I am not able to concentrate as well as usual[b]	1.83 (0)
It's hard to stay motivated for my classes[b]	1.98 (1.41)
I am unable to keep up with my schoolwork[b]	1.35 (0.71)
My schoolwork load has increased since the COVID-19 pandemic started[c]	2.62 (0)
I am having difficulty obtaining tutoring services since the COVID-19 pandemic started[c]	1.7 (0.71)
I am confident that I can progress in my academic/career goals through online learning[c,d]	1.63 (0.71)
I feel that online learning will hinder my communication and networking skills needed for my career post-graduation[c]	2.66 (0)
Composite ERG Growth Score	1.96 (0.1)

CCAPS-62 = Counseling Center Assessment of Psychological Symptoms-62; ERG = existence, relatedness, and growth.

[a] Question responses were on a scale ranging from 0 to 4.

[b] Indicates a survey question item that is original to the CCAPS-62 survey.

[c] Indicates a question created by the authors and added to the survey to assess Alderfer's ERG theory.

[d] Reverse scoring was used for responses.

known as "low-clinical," group includes students with moderate distress and elevated, also known as "high-clinical," group includes students with high distress. It is recommended that the low- and high-clinical student groups be further assessed.

To assess Alderfer's[12] ERG, select questions from the CCAPS-62 survey were selected in addition to questions crafted by the authors of this manuscript to assess existence, relatedness, and growth. The survey utilized three questions crafted by the authors to measure the existence need including concerns about personally contracting COVID-19, changes in financial stability since COVID-19, and difficulty obtaining basic needs (Table 1). Relatedness needs were measured by five questions from the CCAPS-62 survey and two additional questions formulated by the authors to assess changes in social interactions since the COVID-19 pandemic (Table 1). Finally, to assess growth needs based on Alderfer's[12] theory, seven questions were included in the survey, three from the CCAPS-62 questionnaire and four developed by the authors to further assess growth difficulties since COVID-19. A score of zero on the ERG questions indicates no deficiency or needs in that specific category and a score of 4 would be indicative of a large need or deficiency in this category. A combination of negative and positively worded questions was used to limit acquiescence bias. For questions that were asked in a positive context, reverse scoring was used.

Data were exported from the online survey tool to SAS On Demand Version 3.8 (SAS Institute, Inc.), and students who did not fully complete the survey were excluded from the study ($n = 43$). Descriptive statistics were calculated for each category of questions: GA (primary objective), existence, relatedness, and growth. Cronbach alpha was used to measure internal consistency or reliability of the questions in each category with a threshold value of 0.7. To identify the association between GA symptoms and each component of the ERG, a multiple linear regression and Pearson's correlation analysis was conducted. To identify predictors of anxiety symptoms the impact of each demographic factor was analyzed using a bivariate analysis through analysis of variance or *t*-test as appropriate. In order to control for confounding variables a multivariable linear regression was conducted. A P value of $<.05$ was considered significant.

Results

Of the 513 first- through fourth-year student pharmacists, 214 entries were fully completed (42% effective response rate). Respondents were mostly female students and over half were of Asian ethnicity (Table 2). Most respondents were employed, exercised occasionally, and were not married. GA symptom questions had good internal consistency with Cronbach α coefficient = 0.88. The reliability of relatedness and growth questions was acceptable and confirmed with Cronbach α coefficient = 0.75 and 0.79, respectively. Existence questions had unreliable internal consistency, Cronbach α coefficient = 0.65.

The mean composite GA symptoms score among students was 1.28 (SD = 0.71) out of 4. Among students, 49.01% had no-clinical, 31.31% had low-clinical, and 19.63% had high-clinical GA symptoms. The average scores for existence, relatedness, and growth questions were 1.89 (0.95), 1.78 (0.79), and 1.96 (0.1), respectively. The largest need was detected among growth-related questions, specifically to responses to statements like, "I feel that online learning will hinder my communication and networking skills needed for

Table 2
Demographics of student pharmacists who completed the CCAPS-62 and Alderfer's ERG survey.

Variable	Respondents ($n = 214$)		No-clinical GA	Low-clinical GA	High-clinical GA
Current standing in the PharmD curriculum	Study population	COP population			
P1, n (%)	58 (27.1)	126 (25.1)	36 (16.8)	15 (7)	7 (3.23)
P2, n (%)	67 (31.3)	125 (24.9)	27 (12.6)	24 (11.2)	16 (7.5)
P3, n (%)	38 (17.8)	113 (22.5)	18 (8.4)	9 (4.2)	11 (5.1)
P4, n (%)	51 (23.8)	138 (27.5)	24 (11.2)	19 (8.9)	8 (3.7)
Gender	Study population	COP population			
Females, n (%)	148 (69.2)	332 (66.1)	71 (33.2)	45 (21)	32 (15)
Males, n (%)	66 (30.8)	170 (33.9)	34 (15.9)	22 (10.3)	10 (4.7)
Ethnicity	Study population	COP population			
Asian, n (%)	103 (48.1)	267 (53.2)	48 (22.4)	34 (15.9)	21 (9.8)
White, n (%)	58 (27.1)	105 (20.9)	33 (15.4)	17 (7.9)	8 (3.7)
African American, n (%)	18 (8.4)	48 (9.6)	10 (4.7)	4 (1.9)	4 (1.9)
Latin, n (%)	18 (8.4)	55 (10.9)	8 (3.7)	5 (2.3)	5 (2.3)
Other, n (%)	8 (3.7)	27 (5.4)	3 (1.4)	3 (1.4)	2 (0.9)
Multiracial, n (%)	9 (4.2)	NA	3 (1.4)	4 (1.9)	2 (0.9)
Married, n (%)	38 (17.8)		26 (12.1)	8 (3.7)	4 (1.9)
Not Married, n (%)	176 (82.2)		79 (37)	59 (27.6)	38 (17.8)
Employed, n (%)	124 (57.9)		58 (27.1)	36 (16.8)	30 (14)
Not Employed, n (%)	90 (421.1)		47 (22)	31 (14.5)	12 (5.6)
How often do you exercise					
Occasionally, n (%)	105 (49.1)		56 (26.2)	32 (15)	17 (7.9)
2–3 times per week, n (%)	54 (25.2)		27 (12.6)	15 (7)	12 (5.6)
Never, n (%)	40 (18.7)		13 (6)	16 (7.4)	11 (5.1)
Every day, n (%)	15 (7)		9 (4.2)	4 (1.9)	2 (0.9)

CCAPS-62 = Counseling Center Assessment of Psychological Symptoms-62; COP = college of pharmacy; ERG = existence, relatedness, and growth; GA = generalized anxiety; NA = not applicable; P1 = first professional year; P2 = second professional year; P3 = third professional year; P4 = fourth professional year; PharmD = doctor of pharmacy.

my career post-graduation" with a mean score of 2.66 and "My schoolwork load has increased since the COVID-19 pandemic started" with a mean score 2.62 (Table 1).

To assess the secondary objective of Alderfer's[12] ERG need most associated with higher symptoms of anxiety, a multivariable model with GA symptoms as the dependent variable and Pearson's correlation was performed. The relatedness need had the largest parameter estimate which signified that for every 1 unit increase in the relatedness parameter there is a 0.56 increase in GA symptoms ($P < .001$) (Table 3, Model 1). Existence and growth needs were also potential predictors of GA symptoms in the regression model. The multivariable model was able to account for 46.1% of the variance in GA symptoms ($R^2 = 0.461$).

To assess potential predictors of GA symptoms, a multivariable model including the ERG and demographic parameters was performed (Table 3, Model 2). The ERG parameters and lack of exercise were associated with GA symptoms ($P < .05$).

Deficiency in relatedness had the highest correlation with GA symptoms (Peason's rho, $r = 0.65$). To a lesser extent, growth needs were moderately correlated with GA symptoms and the existence need had a weak correlation to GA symptoms ($r = 0.52$ and $r = 0.3$, respectively), Nonetheless, significance was confirmed in each instance ($P < .001$) (Table 4).

Discussion

This study, to our knowledge, is the first to use the ERG theory to identify which unmet needs during the COVID-19 pandemic are predictive of higher levels of GA symptoms using the CCAPS-62 survey among PharmD students. Based on our findings, 50.93% of PharmD students met the clinical cut-off for GA symptoms. These results were comparable to that of a previous study. Zakeri et al.[19] utilized the CCAPS-62 survey to analyze factors associated with GA in April 2020 and found that 50% of first- through third-year student pharmacists experienced GA. Fischbein and Bonfine[6] collected surveys from student pharmacists at multiple universities and colleges using the Generalized Anxiety Disorder 7-item (GAD-7) questionnaire, an instrument that helps classify symptom severity and aid practitioners in diagnosing GA, during 2016–2017 school year.[20] They found that 21% of student pharmacists met the clinical cut off for GA pre-COVID-19. Shangraw et al.[3] administered a survey to estimate GA among first- through third-year student pharmacists using the GAD-7 questionnaire and found that 30% of students self-reported having clinically significant anxiety symptoms in 2019. Although a direct comparison cannot be made, more PharmD students experienced clinical cut-offs for GA compared to previous findings. However, it is important to note that this study was conducted during the COVID-19 pandemic which may have contributed to higher levels of GA among our students.

Although some of the aforementioned studies utilized the GAD-7 to assess GA, our study intentionally utilized the CCAPS-62 survey

Table 3
Model 1 multivariable linear regression model of ERG and GA symptoms as dependent variable and Model 2 multivariable linear regression model of student demographics and GA Symptoms as dependent variable.

Model 1 $R^2 = 0.461$				Model 2 $R^2 = 0.46$			
Parameter	Parameter estimate (B)	Standard error	*P* value	Parameter	Parameter estimate (B)	Standard error	*P* value
Existence	0.12	0.05	0.01	Existence	0.17	0.06	.002
Relatedness	0.56	0.07	< 0.001	Relatedness	0.43	0.08	< .001
Growth	0.21	0.07	0.002	Growth	0.28	0.08	< .001
				Graduation class			
				Class 2024	Reference	Reference	Reference
				Class 2023	0.01	0.13	.94
				Class 2022	−0.06	0.15	.69
				Class 2021	0.12	0.14	.38
				Gender			
				Male	Reference	Reference	Reference
				Female	0.17	0.1	.11
				Ethnicity			
				White	Reference	Reference	Reference
				Asian	−0.02	0.13	.86
				Latin	0.17	0.19	.36
				African American	−0.1	0.2	.61
				Other	0.11	0.19	.56
				Marital status			
				Married	Reference	Reference	Reference
				Not married	0.26	0.14	.05
				Employment status			
				Employed	Reference	Reference	Reference
				Not employed	- 0.14	0.1	.17
				Exercise			
				No (Never)	Reference	Reference	Reference
				Yes[a]	−0.33	0.12	.008

ERG = existence, relatedness, and growth; GA = generalized anxiety.
[a] Yes response includes exercising every day, two to three times per week, and occasionally.

Table 4
Correlation of ERG with each other and with GA symptoms.

Independent Variable	Generalized Anxiety	Existence	Relatedness	Growth
Generalized anxiety	1	NA	NA	NA
Existence	0.3	1	NA	NA
Relatedness	0.65	0.25	1	NA
Growth	0.52	0.22	0.6	1

ERG = existence, relatedness, and growth; GA = generalized anxiety; NA = not applicable.

since it is a validated tool designed by counseling center staff and researchers to assess key domains of college students' mental health rather than a diagnostic tool. The CCAPS-62 survey has been used in previous studies to assess GA symptoms among graduate students and has been utilized by over 120 colleges and universities across the US.[18–19] The authors of this paper intentionally chose to utilize the CCAP-62 survey instead of the GAD-7 as the latter was designed to be used in a clinical setting to diagnose, assess, and monitor patients with GA. Since participant responses in this study were anonymous, the authors did not feel comfortable utilizing the GAD-7 diagnostic tool without being able to refer or reach out to students that may have experienced high GA levels to seek further care.

COVID-19 affected student pharmacists in different ways based on graduation class. More second-year student pharmacists met the clinical cut-offs for GA symptoms compared to other classes. In our curriculum, second-year student pharmacists start integrated modules with an affiliated skills lab which can be academically demanding and challenging. The adjustment to a more demanding curriculum may have contributed to an increase in GA symptoms among this student population. In addition, more female students met clinical cut-offs for GA symptoms compared to male students. This is consistent with previous studies that found associations between higher level of GA among female pharmacy students and other health professions.[20–22]

Based on our results, all factors of Alderfer's[12] ERG theory correlated with GA symptoms among PharmD students during the COVID-19 pandemic. This is consistent with previous findings where college students reported increased anxiety during the pandemic due to worrying about their health, which correlates with existence needs, less social interactions which is consistent with the relatedness need, and difficulty concentrating and concerns on academic performance, which corresponds with growth needs.[4]

Among the ERG factors, the relatedness need had the strongest correlation to GA symptoms among our cohort of students. This suggests that GA symptoms among PharmD students are largely correlated to a deficiency in social connectedness and sense of belonging during the COVID-19 pandemic. As a result of an abrupt campus shutdown, instruction was shifted to an online setting, and social events and extracurricular activities that had been opportunities for students to bond and connect were either dismantled or transitioned to an online setting. Interpersonal relationships both inside and outside the classroom with peers and faculty are essential to student wellbeing and success.[23] In addition, students with a weak sense of belonging have poor metal health compared to those who have a strong sense of belonging.[24–25] Based on Alderfer's[12] ERG theory, relatedness needs are associated with a sense of belonging. Underrepresented minority pharmacy students have noted a lack of belonging and support compared to other students which can affect emotional wellbeing.[26] Although this study did not find a significant difference between GA levels and ethnicity, more studies are needed to include a more racially and ethnically diverse student population. Interventions aimed at increasing social connectedness and sense of belonging, especially during the COVID-19 pandemic are dire to mitigating GA symptoms among PharmD students.

Alderfer's[12] ERG theory is an extension of Maslow's[27] hierarchy of needs that suggests before humans can meet their full potential, they need to satisfy specific lower-level needs before higher-level needs. Maslow's[27] needs include physiology and security, sense of belonging and interpersonal relationships, and self-actualization in order from lower to higher level. Alderfer's[12] ERG needs align with Maslow's[12] physiology and security, sense of belonging and interpersonal relationships, and self-actualization needs, respectively. In contrast to Maslow,[27] Alderfer's[12] theory does not suggest a hierarchy of needs, rather humans may be trying to achieve many different needs on more than one level at the same time. Based on our results, the relatedness need was strongly correlated with GA symptoms whereas growth and existence were less correlated with GA symptoms. Therefore, Alderfer's[12] theory of needs suggesting a lack of hierarchy is supported in our study as students may lack relatedness but were more likely to achieve other needs prior to relatedness. Hoying et al.[28] found that predictors of anxiety among health care profession students include inadequate sleep, unhealthy lifestyle, worse general health, and higher stress. Exercise has been shown to significantly reduce anxiety levels among adults.[29–31] Zakeri et al.[19] found an association between low physical activity and clinical GA symptoms among PharmD students using the CCAPS-62 survey. Consistent with their findings, our study showed that students who never exercised had significantly higher GA symptoms compared to those who exercised daily, two to three times per week, and occasionally.

Even with universities reopening, a full return to pre-COVID normalcy is highly unlikely. Some universities have or plan on fully reopening while others will continue to provide hybrid classes.[32] Nonetheless, steps to address student needs will be essential to ensuring their success in any format of instruction. At this institution there is a dedicated wellness committee that consists of students, faulty, and staff. This committee implemented strategies to mitigate social isolation and disconnectedness in efforts to decrease GA symptoms among PharmD students.

Developing and strengthening resilience skills may help students better adjust to changing circumstances, such as those imposed through the COVID-19 pandemic and continue to thrive in the face of adversity. One intervention implemented to strengthen resilience and social connectedness was piloting the Student Curriculum on Resilience Education to first-year pharmacy students. This intervention was piloted at the COP in collaboration with the university wellness and counseling centers. This four-week, online resilience program is designed to help students cope with the personal, social, and academic challenges of college life by providing practical information and strategies to develop healthy relationships, manage stress, and maintain a healthy body and mind.[33] The program has

a dedicated module that focuses on building social connections and their impact on resilience. This program has a range of instructional elements including online self-reflections, questionnaires, activities, and personalized reports for students and can be adapted to in-person, hybrid, or virtual settings. Based on preliminary data, 89% of students felt they have a better understanding of resilience and 84% of students felt that this resiliency program would positively impact their pharmacy careers.[34] In the future, the college and wellness and counseling centers plan to assess the impact of this program on students' wellbeing and social connectedness by monitoring pre- and post-GA levels, perceived stress, and using qualitative student data to gain insight on how long-term resiliency skills impact GA symptoms.

Another intervention involved increasing awareness of mental health disorders through a virtual health fair in spring 2021 to provide campus- and community-based resources for support. Information regarding the counseling center services on campus and anecdotal life experiences regarding mental health struggles and ways to get help were shared with students. Furthermore, to stimulate connectedness among students, breakout rooms with a variety of virtual team building activities including escape rooms were also built in. In the future, this committee plans to develop a phone application where students can share common professional interests and create communities where students are able to connect with one another regardless of physical location. Based on our findings, we recommend institutions implement an advisory committee and work collaboratively with student leaders to initiate interventions focused on student wellness and increasing social connectedness. Interventions can be a combination of one-on-one and community engagement activities. One-on-one opportunities can include peer mentorship programs where students with similar interests are paired and engage in virtual check-ins. A combination of face-to-face, video conferencing, and phone check-ins can be utilized. On a larger scale, peer-delivered support groups can be established, to create a sense of community among students. Furthermore, a "warm line," which is a 24-hour emergency crisis line, can be established for students who need emotional support and seminar series to help students manage stress and promote resiliency. Institutions should organize meaningful activities that promote staying active which may include Zumba, yoga, or tai chi classes in in-person and virtual environments. A seminar series should also be implemented to shed light on mental health difficulties students may be experiencing to understand they are not alone.

Instructors can also be a vital part of promoting social connectedness and support for students. Opportunities for community building can start within a classroom by encouraging student engagement and opportunities for group learning. This mission should also be reflected in syllabi by embedding resources to promote student wellness. In virtual or hybrid settings, synchronous instruction (via live stream instruction or breakout groups) that emphasizes social interactions can help increase sense of belonging and promote comfortable and natural interactions with one another compared to asynchronous instruction.[35] Instructors also play an important role in helping students feel accepted, included, and connected. Inside the classroom, instructors can increase opportunities for collaboration through group work via an interface that allows video conferencing to promote face-to-face interactions and synchronous chats or discussions. In addition, being intentional about the delivery of direct instruction and incorporating active learning can help social connectedness. Opportunities to foster meaningful relationships among students can happen both in and out of the classroom. Getting to know students through networking, mentorship, and being receptive to student feedback on in-class experiences can also promote social connectedness and belonging.[35]

Students have faced adversities before COVID-19; however, many have been exacerbated with the onset of the pandemic. Even with a transition back to traditional classroom settings, PharmD students are among a vulnerable population for mental health disorders. To mitigate these health risks and ensure academic success, educational institutions have the responsibility of assessing and addressing student needs. To prioritize interventions, institutions can utilize student needs assessment data collected through surveys to make informed decisions that serve as the groundwork for interventions.[36] The authors encourage institutions to have a diverse, action oriented, wellness committee that is focused on promoting the health and wellbeing of students, staff, and faculty. Each institution may have very different needs and interventions based on their student population and these needs may change over time. Therefore, assessing student needs continuously is dire to adapt interventions appropriately.

This study has limitations. Biases intrinsic to survey-based research are possible, including non- response due to a limited response rate of 42%, social desirability, and self-reporting bias. Although the student demographics in this study align with the demographics at the COP, the single center and voluntary nature of this study limits the generalization of the results since other institutions have different student demographics and thus different needs. Nevertheless, trends in GA symptoms among PharmD students were similar to those observed in college students.[37] Depending on the sociodemographic factors of the student population, student needs and institution-specific interventions will differ. In this study, existence questions had a low internal consistency. Finally, results should be interpreted with caution because this study used the validated CCAPS-62 instrument in an unvalidated context, specifically Alderfer's[12] ERG theory.

Future studies may consider adding additional existence questions to the survey to strengthen the internal consistency. In addition, the survey used in this study did not include questions related to the impact of COVID-19 on experiential education and if these changes could have been a stressor for fourth-year student pharmacists. Also, future research could have participants elaborate through open-ended questions on factors that may be contributing to their GA, their perceived needs, and how institutions can provide them with support to fulfill those needs. This survey was also sent out approximately seven months after shutdowns took place, which may not be reflective of the needs of students at different time periods during the pandemic. Future studies can assess student needs at different time periods to examine if there is a shift in needs and ideally compare GA symptoms pre- and post-COVID-19 pandemic.

Conclusions

This is the first study to use the ERG theory of needs to determine predictors of GA symptoms among PharmD students during the COVID-19 pandemic. Over half of PharmD students met clinical cut-offs for GA symptoms during the COVID-19 pandemic. The

relatedness need was most predictive of GA symptoms among students. A lack of exercise was also associated with higher GA levels. These findings informed the development of interventions aimed at increasing and maintaining social connectedness among students on an institutional level and in a one-to one format. Realizing that students' needs may differ across institutions, more studies are needed to assess student needs related to anxiety. Colleges should continue to implement and maintain strategies through a variety of formats (virtual and in person) to improve their student's wellbeing while building and maintaining social connectedness.

CRediT authorship contribution statement

Rania El-Desoky: Conceptualization, Methodology, Data curation, Writing – original draft, Software, Validation, Formal analysis. **Austin De La Cruz:** Data curation, Writing – review & editing, Methodology. **J. Douglas Thornton:** Data curation, Writing – review & editing, Methodology, Formal analysis, Validation, Conceptualization. **Matthew A. Wanat:** Conceptualization, Writing – review & editing, Methodology. **Divya Varkey:** Conceptualization, Writing – review & editing, Methodology, Supervision, Validation.

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