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## Mapping the impact of the COVID-19 pandemic on pharmacy graduate students' wellness

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### ABSTRACT

**Background:** The COVID-19 pandemic has resulted in significant changes in pharmacy graduate students' (PhGS) lives. While pharmacy graduate programs across the U.S. have reported adjustments due to the pandemic, there is currently no data on the PhGS' wellness, and the impact on and extent to which offered supports and guidance has met PhGS needs.

**Objective:** This study's objectives were 1) to explore PhGS' perspectives on their challenges and the impact of these challenges on their wellness, and 2) to identify PhGS' suggestions for pharmacy graduate programs to improve guidance and support offered during the COVID-19 pandemic.

**Methods:** This study conducted semi-structured interviews based on the Objective, Reflective, Interpretative, Decisional (ORID) methodology. Pharmacy students working on completing a PhD in programs across the United States were invited to participate. All interviews were conducted using the Zoom platform between May and June 2020. Digital audio recordings were auto transcribed using the Trint platform. Thematic analysis was conducted using the six-dimensional model of wellness developed by Hettler as a guide, while open coding of the PhGS' suggestions was conducted inductively.

**Results:** Thirteen PhGS across six universities in the U.S. were interviewed. During the pandemic, all six dimensions of the Wellness model were found to be challenged for PhGS. PhGS' challenges differed based on their laboratory-based vs. non-laboratory-based research settings. International PhGS reported differing challenges from domestic PhGS. PhGS also provided 18 practical suggestions for improving the teaching process and facilitating student's academic growth in the context of the COVID-19 pandemic.

**Conclusions:** Despite the COVID-19 pandemic, graduate programs should continue developing a robust and tailored system to encourage and maintain mentorship programs to facilitate graduate students' successful path through their doctoral studies. Moreover, the suggestions offered by the PhGS participants in this study, when appropriately implemented, can also position graduate program success post-pandemic.

### Introduction

Pharmacy graduate students (PhGS) are an important intellectual future asset in both academia and the pharmaceutical industry. The American Association of Colleges of Pharmacy (AACP) estimated that as of fall 2018, 4524 full-time students were enrolled in graduate programs in pharmaceutical sciences across seventy-nine colleges and schools in the U.S.<sup>1</sup> As the number of PhGS in the U.S. increases,<sup>1</sup> their role in the intellectual workforce becomes even more significant. Thus, assuring that PhGS are successful during their studies is amongst the highest goals of every graduate program.

The COVID-19 pandemic has resulted in significant negative effects

in many aspects of life across various populations.<sup>2</sup> The COVID-19 pandemic has caused many universities to shift to online and remote course delivery modes.<sup>3</sup> Added to the stress of changing course delivery modes, the pandemic might have also led to increasing social isolation due to social distancing and shelter at home orders, decreased physical activity, concerns about individual health, and potential academic and non-academic challenges. PhGS are already among those demographics at high risk of negative mental health impacts related to anxiety and depression, and this crisis may have exacerbated this further.<sup>4</sup> Furthermore, differences between domestic and international PhGS' challenges during normal times are known,<sup>5</sup> suggesting potential differences during the COVID-19 pandemic as well.

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Many college mental health services are responding to this situation, offering support for graduate students. Also, pharmacy graduate programs across the country have reported adjustments to provide their graduate students with support and guidance. However, there is currently no data about the challenges being faced by PhGS during this pandemic, their awareness of the opportunities their graduate programs are offering, and the extent to which offered support is meeting the PhGS needs. Understanding these factors may help graduate programs in formulating informed guidelines for academic guidance and non-academic support for PhGS during the COVID-19 pandemic. To address these unexplored issues during the COVID-19 pandemic, this qualitative study will explore PhGS' challenges using the six-dimensional model of wellness developed by Hettler,<sup>6</sup> and PhGS' perceptions on the received support and guidance from individual graduate programs. The study timeframe, from research protocol development to data analysis, includes May to September 2020. This study aims to provide insight into the PhGS' challenges during the COVID-19 pandemic and identify potential areas for improvement by graduate programs.

## Objectives

The objectives of this study are:

- 1) Explore PhGS' perspectives on their challenges and the impact of these challenges on their wellness during the COVID-19 pandemic.
- 2) Identify PhGS' suggestions for pharmacy graduate programs to improve guidance and support offered during the COVID-19 pandemic.

## Methods

### Study design

This is an exploratory study with a qualitative design using semi-structured in-depth interviews. The consolidated criteria for reporting qualitative research (COREQ) guideline<sup>7</sup> was used to report this study to ensure rigor and transparency (Supplementary material: [Appendix A](#)).

Semi-structured interviews were chosen as the data collection method to explore the PhGS' perceptions of their challenges during the COVID-19 pandemic in their own words and enable focusing on meaningful and unique issues while allowing expression of diverse perceptions.<sup>8,9</sup> A conceptual basis for the interviews was developed based on an evaluation of the literature on graduate students' challenges in general,<sup>10,11</sup> COVID-19 pandemic trends, and the impact on different aspects of the life of the general population,<sup>12</sup> as well as on reflection about the personal experiences of the principal researcher being a pharmacy graduate student during this pandemic. The semi-structured in-depth interview guide was developed following the five-step process recommended by the framework for developing qualitative semi-structured interview guides by Kallio et al. (2016) and the ORID (Objective, Reflective, Interpretative, Decisional) methodology was utilized to design the interview protocol.<sup>13,14</sup> Thereby, with the opening questions being objective, they had the function of a warm-up activity, where participants were asked their age, country of origin, the graduate program, and the academic year in which they were enrolled. At the reflective level, students were asked about their experiences on six dimensions of the wellness model.<sup>6</sup> They provided information on the physical, emotional, spiritual, intellectual, environmental, and social aspects of their lives. At the interpretative level, participants were asked about the impact of challenges on their wellness. Finally, at the decisional level, questions asked PhGS' if their needs are being met by the guidance and support offered by their graduate programs.<sup>14</sup> This is also the space used by PhGS' to offer suggestions for how the graduate programs' approach in guiding and supporting their students differently during the COVID-19 pandemic.

The developed interview protocol has been pilot tested in two semi-structured interviews conducted online using Zoom platform,<sup>15</sup> one with a domestic PhGS and one with an international PhGS. This step assured the intelligibility and relevance of questions,<sup>16</sup> as well as the researcher's ability to conduct data collection. Minor changes were made to the final interview protocol, including adding two follow-up questions. The final interview protocol is attached as an appendix to this paper (Supplementary material: [Appendix B](#)).

### Sample population/recruitment strategy

A purposive selection strategy was utilized, targeting PhGS across universities in the U.S. Around hundred faculty and chairs departments with graduate programs in schools/colleges of pharmacy were contacted via e-mail by the principal author and were asked to forward the recruitment e-mail to their PhD students.

### Data collection

All interviews were conducted online using the Zoom platform,<sup>15</sup> between May and June 2020. All 13 PhGS that accepted the study invitation received the information letter outlining the study in detail, a generic release form to sign electronically, and the Zoom meeting link for a date of their choice. The online semi-structured 30-60-min interviews were audio-recorded for data analysis purposes, and participants were offered the option of receiving a summarized report of the findings of this study. Data saturation was reached upon the completion of the 10th interview when new information being captured for the two interviews was minimal and there was no new data for more than three interviews. However, the researchers decided to conduct the three final scheduled interviews to recognize the participants' time and willingness and further ensure the research's validity. Ethics approval (Protocol #20x-185) has been obtained prior to data collection from the IRB at the University of Mississippi.

### Data analysis

Digital audio recordings were auto transcribed using the Trint platform.<sup>17</sup> Transcripts were edited, verified, and de-identified by two researchers (HI and SJ) of this study within the Trint software. Three researchers (HI, SJ, and MR) conducted the data analysis independently by using deductive coding for the interview protocol's reflective level questions. Thematic analysis was performed using the six-dimensional wellness model<sup>6</sup> as a coding guide in Microsoft Word.

The six dimensions of the wellness model include social, intellectual, physical, occupational, emotional, and spiritual.<sup>6</sup> The social dimension of the wellness model measures to what extent one contributes to society's common welfare. This may depend on relationships and interaction with others in society. The two constructs used to measure the social dimension are living situation and relationships. The intellectual dimension of the wellness model measures the engagement of individuals' minds with creative mental activities. The constructs used to measure the intellectual dimension are studying and productivity. The third dimension of the model of wellness is physical. This dimension measures the extent to which an individual maintains strength and flexibility, and behaviors related to illness detection. The physical dimension includes three sub-dimensions, namely eating pattern, physical activity, and sleeping pattern. Eating pattern refers to how an individual chooses food items to eat which match the dietary goals. The fourth dimension of the model is occupational, and it measures the extent to which an individual is satisfied and enriched with their work. The occupational dimension is measured using two constructs: work-leisure time balance and occupational satisfaction. The fifth dimension of the wellness model is emotional and measures the extent to which an individual is aware of and accepts one's feelings. The two constructs used to measure the emotional dimension are emotional

stability and stress levels. The sixth and the last dimension of the model of wellness is spiritual. It measures the extent to which an individual is involved in looking for meaning and purpose in life. The spiritual dimension is measured using the constructs: life purpose and self-reflection.

While the decisional level questions' data were coded through open coding, emerging themes were inductively derived from participant responses for analysis and interpretation. The qualitative results were summarized and analyzed using a framework matrix, with the goals of characterizing constructs for the first objective and finding patterns for the second objective of the study. The themes were finalized, and a consensus was arrived at by mutual discussion between the three coders. Descriptive statistical analysis for participant demographics was conducted using statistical software IBM SPSS v25.

**Results**

A total of 13 semi-structured interviews were conducted. Data saturation was considered to be achieved after ten interviews, whereby no new insight was being gained.<sup>18</sup> An additional three interviews were conducted to confirm data saturation.

Out of the 13 interviews of PhGS, eight were domestic students, and five were international students. Further, the domestic student sample comprised of two males and six females, while the international student sample comprised of three males and two females. The mean age for all 13 participants was 30.3 (22–48). To the nearest minute, the average length of the interviews was 52 min. Approximately 15% (n = 2) of participants were currently in their first academic year of graduate school, 23% (n = 3) in their second academic year of graduate school, 23% (n = 3) in the third year of graduate school, 30.76% (n = 4) in their fourth year of graduate school and only 7.69% (n = 1) in their fifth year of graduate school. The graduate program type differed based on laboratory-based and non-laboratory-based, with 38.46% in the former and 61.53% in the latter (see Table 1 for complete details).

The challenges faced by PhGS are outlined using the six-dimensional model of wellness developed by Hettler.<sup>6</sup>

*Social dimension*

With respect to the construct of living situation, some participants lived alone, while others had other people living with them. These situations impacted participants' experiences in distinct ways. For instance, participant 12 expressed about living alone, "So, that [living alone] was a little bit difficult at times because I didn't want to feel like I was bothering someone if I just called them out of the blue without scheduling a call. So, that was the toughest thing of living alone."

**Table 1**  
Participants' characteristics (n = 13).

| Variables                     | Domestic students (n = 8) | International students (n = 5) | Total (n = 13) |
|-------------------------------|---------------------------|--------------------------------|----------------|
| Age (mean, SD)                | 30.63 (7.945)             | 29.80 (4.147)                  | 30.31 (6.537)  |
| <b>Gender (n, %)</b>          |                           |                                |                |
| Male                          | 2                         | 3                              | 5 (38.46%)     |
| Female                        | 6                         | 2                              | 8 (61.53%)     |
| <b>Academic year enrolled</b> |                           |                                |                |
| 1st year                      | 1                         | 1                              | 2 (15.38%)     |
| 2nd year                      | 2                         | 1                              | 3 (23.07%)     |
| 3rd year                      | 2                         | 1                              | 3 (23.07%)     |
| 4th year                      | 3                         | 1                              | 4 (30.76%)     |
| 5th year                      | 0                         | 1                              | 1 (7.69%)      |
| <b>Graduate program</b>       |                           |                                |                |
| Research laboratory-based     | 3                         | 2                              | 5 (38.46%)     |
| Research non-laboratory based | 5                         | 3                              | 8 (61.53%)     |

However, for participant 13, living with someone had helped them feel like they reacted better to the shelter at home orders, "Maybe, that's why I'm reacting better because I have people around me to talk to but, if I did not, that it would have been really, really difficult... Obviously, there were challenges as well, but I think I handled these better than expected ... " (P13). Most participants faced difficulties and challenges with their living situation due to the pandemic. As participant 6 stated, "I think everyone's mental health kind of took a little hit during this time ... And I think for us [PhGS], like, kind of worrying about what does this mean for my research? What does this mean for my thesis or dissertation? I think just having increased anxiety..."

The second sub-dimension of the social dimension is relationships. Relationships of PhGS, be it professional or social, were also hampered due to the COVID-19 pandemic. This can be seen in a quote from participant 8, "I'd say the social support system has gotten very small just because you can't physically be there for each other. It's only so many times you can facetime." PhGS professional relationships were also affected. With classes and communication with faculty being shifted to online platforms, PhGS relationships with their faculty advisor/mentor were also impacted. As participant 4 said, "My advisor is super busy usually, and at least when I was in, at the university I used to get a chance at least twice in a week to meet him, but now it's difficult, and he's also busy, and it takes some time for him to respond to my e-mails. Like access quality, I felt like it has decreased."

*Intellectual*

Among the 13 participants, most felt that their studying patterns had been altered since the beginning of the pandemic. Participant 9 stated, "I'm doing all of that work from home, and it's probably more difficult to focus doing it at home without having that special workspace, where your life is kind of all combined. So that, I think, has affected studies." However, a few participants felt that the pandemic had not affected their studying patterns. Participant 5 said, "All the work I did before the pandemic was at my desk at home and so actually, I didn't really experience any difference... So, it actually hasn't affected my studying at all."

An additional challenge faced by PhGS was the inability to study and learn with fellow graduate students. Participant 2 said, "Before I admit, we met in the office, have a chat and actually talk longer... talk about a bunch of things that are not included in the meeting. You know, I learn more, I get that, you know, oh, by the way, also how can you do this? But, if it's an e-mail now, you just focus on just that exact thing. So, it has affected the learning itself."

The second sub-dimension is productivity. With respect to productivity, Participant 4 said, "I thought initially, like, okay, now this is the time to quarantine, I can finish up my writing work. But, I'm actually not able to concentrate that much... productivity has been decreased." Challenges concerning productivity may also differ for different graduate programs. Participant 2 stated, "As a pharmacy graduate student, the biggest challenge now is having the labs closed. I couldn't do anything in the lab for at least one and a half months. I feel like that's a big challenge, and, you know, the more time that goes, you feel like it's wrong on you..." PhGS enrolled in non-laboratory-based research programs faced similar research-related challenges. Participant 7 said, "My methodology for my dissertation had to be modified slightly... [because it was] no longer appropriate in a COVID era to do in-person interviews."

*Physical*

The eating patterns of PhGS were affected as balancing work from home and other daily living activities tended to be difficult during the quarantine. Participant 3 stated, "Everything is prepared in my home, but because I'm working so much, I don't cook as often as I would cook in my home. So, I'm typically eating a can of soup." The physical activity

of PhGS was also affected due to the pandemic. When Participant 4 was asked about physical activity, they said, “Decreased, decreased by more than 70% ... Just going for an evening walk.” Lastly, sleeping patterns were also affected as PhGS’ schedules were disturbed. Each day in a PhGS’s life is decided on the number of classes per day and wet lab/dry lab work. Due to the pandemic, participant 2 stated, “My typical day is obviously very different since I don’t have to leave home for school, my schedule has kind of changed actually. Now, I sleep late in the night; sometimes I sleep at 4 a.m. in the morning.”

### Occupational

As PhGS had to work from home, many participants felt that they were given excess work, which may have affected the work-leisure time balance. Participant 7 stated, “Just because people are working like, you know, 90 h a week doesn’t mean that we should have that expectation that we should be working that many hours too. You know, we need to stop and take a break. This is like taking a toll on everybody.” Due to this reason, one of the challenges faced by PhGS was not being able to balance time between work and relaxing. Participant 6 stated, “It is really hard to like kind of draw the line when you’re working now and then relaxing; those can blend together... The days just seem different just because we don’t have that movement from one place to another to really kind of show the start and stop of a workday.”

The second sub-dimension, occupational satisfaction, was also hampered for most of the participants. Graduate school shapes an individual both academically and professionally. Communicating with fellow PhGS and faculty and networking with other professionals during conferences plays a role in a PhGS’s graduate journey. Participant 6 stated, “I think, just making connections with classmates, the professors, other people on your field, like your conferences, I think that’s a challenge, kind of negatively impacting everything.”

PhGS also faced challenges communicating with faculty and collaborating with not only the faculty but also fellow PhGS. Participant 7 stated:

*“You feel like you’re disrupting things. So, I feel hesitant to ask for things. So, I think it’s created a challenge to accomplishing things. Because, you know, when you go and knock on somebody’s door, you can see the door is open, and you see that they are available. But when you e-mail, you have to be very thoughtful about what you’re putting in there. Am I putting too much information? Am I not putting enough? And sometimes I find myself wasting like 30 minutes to an hour, just writing a stupid frigging e-mail and just because it’s to a faculty member. And I can tell you honestly, I get like two-word responses back from my advisor, and it really, it burns me to my core sometimes over how much I agonize over what I say, and I get a two-word response.”*

### Emotional

The pandemic has had a toll on both the emotional stability and stress levels of PhGS. As participant 3 stated:

*“I think the squeaky wheel gets the oil, but sometimes the squeaky wheel gets replaced. And I don’t want to be the PhD student with all the problems and this and that and the other. So, for that reason, I think I’ll probably do what a lot of my classmates are doing, which is do nothing and say nothing, and they would just become invisible and just endure.”*

Stress levels of PhGS have also been affected as they adjust to the new normal. Participant 4 said, “It [stress] has increased... There were days, I woke up at midnight and just saw my phone if I had received any update from, if I got a job, you can just think about my stress level ...” This increased stress has also had adverse effects on work and productivity. Participant 1 said, “I think the situation itself is like everybody is under stress and you don’t want to add on to this. So, you won’t, kind of think, “let’s not

*bother them then.” So that part of the work gets slowed down. It just bothers you because you cannot do anything; you do not have control over it.”*

### Spiritual

Life purpose is an essential factor for a PhGS as it motivates PhGS to complete graduate coursework and carry out their research. Participant 7 stated, “I’ll figure it out, like I really will. I’ve got to adapt. I’m an adapter. I’ll figure this out. But the stress is really keeping me from doing this because it’s just, it’s hard, you know like I don’t shower for three days because I’m tired. I’m tired. I’m really tired.” The major challenge faced concerning life purpose due to the pandemic was the motivational factor to work and be productive from home. Participant 10 said, “On the other side is like I have all this time, but like I have no drive to do anything.”

The second sub-dimension is self-reflection, which may motivate or demotivate PhGS. Participant 7 stated, “I will sit here for hours. And I have been making sure that my deadlines get met. But I have not been exercising. I have not been eating. I have not been prioritizing myself. And I let everything else go for the sake of making sure that my deadlines happen under this crisis. And I’ve got to turn around.” Participant 3 said, “I feel that the longer we’re in COVID-19, the slower I’m able to function. So right before this call, I was speaking with another one of my colleagues, another student, and she said, “I’ve been in the office all day, and I’ve done nothing, and I feel like a failure”...”

Suggestions for pharmacy graduate programs to improve guidance and support offered during the COVID-19 pandemic:

In this section, the participants’ various suggestions for improving PhGS’ wellbeing will be outlined. Participant 3 suggested the need to adjust the workload during the pandemic in order to maintain an optimal quality of life:

*“[Showing] me where the delta is... What did you do different? And why? Or is it the same? ... How was that demonstrated likewise in my study and my assistantship and my quality of life and my work demands and in my treatment as a human? Does anyone at my university care that I am now in blood pressure medicine? Three months ago, I was not.”*

For improving respondents living situation, participant 8 suggested, “So, it would be more helpful if they [supervisors and faculty] asked us, like, how are you doing? How are you feeling? Are you alone? No one has asked me that the fact I live entirely alone, for twelve, thirteen weeks now.” PhGS also suggested having social events or check-in calls, as participant 12 said, “If they can schedule some of those [social events] or just create more kind of interaction outside of the classroom or outside of meetings, I think that would be very helpful and useful for a lot of people.” Participant 9 added, “... I think that’s important to maintain a collaborative environment by working from home.”

As classes shifted to online platforms, participants also suggested making sessions more interactive. Participant 1 suggested, “Probably making it more interactive than just the professor talking and others listening... And you also know that people are there because most of the time I know that when videos are off, like nobody is there, even I am not there.”

Interaction with mentors and advisors can help PhGS cope better with their challenges, especially during the COVID-19 pandemic. Overall, the PI mentoring relationships have been reported to be lacking, as participant 8 suggested:

*“I think because we have such close relationships with our PIs, because that’s the nature of research-based relationships and grad school, I think that they have more of a duty as a mentor to discuss this [the implications of the pandemic on their program] more with us ... It would be nice if they just gave us some real talk to be honest, more of a mentor relationship, that would be super nice in general...”*

Furthermore, acknowledging the work done by PhGS can keep

students motivated and have a purpose for being productive and excelling in graduate school. Participant 3 suggested:

*“How about sending something personal, even if it’s a bit of a postcard? Send something. If you only have, let’s say you have 40 or 50 PhD students. We’ve been at home for two months ... Just something to make you feel like you’re a human and that you’re seen, and you’re heard, and we know it’s hard, but we’re harder together, and we can get through it. I made it through my PhD and during a pandemic, I think I should get a sticker for that.”*

Finally, for students who have yet to graduate, participant 11 suggested the need of adjusting graduate programs’ expectations given the impact of the pandemic: “Maybe they should be really assured that all this pandemic hassle will be considered for their graduation, because if you are expecting me to graduate in 4 years, now after this you should expect me to graduate maybe four and a half or five years... So, just some reassurances that this will be taken into consideration.”

**Discussion**

This study’s findings offer insights into the challenges PhGS face during the COVID-19 pandemic and the impact of these challenges on PhGS’ wellness. During the pandemic, all six dimensions of the Wellness model were found to be challenged among PhGS. The PhGS’ stress levels were higher during the pandemic, accompanied by a limited social support system, lack of collaborative work environments, challenged research work requiring cancellation or modification of projects, lack of mentorship, and challenged electronic communication with professors and advisors. However, the only element reported having been less impacted was life purpose, which was assessed as part of the spiritual dimension. PhGS reported having a clear purpose for finishing their PhD studies, despite the challenges. This finding might be explained due to the high internal locus of control and high levels of motivation of graduate students in general.<sup>19</sup>

The intellectual and occupational wellness dimensions were challenged and impacted by many factors, including the difficulty encountered by not having easy communications between faculty and students. Faculty-graduate student working relationships are a sine qua non of PhD studies success, and its importance has been revealed consistently through research.<sup>20</sup> Recommendations from this qualitative study on transparent communication between the PhGS and the graduate programs, as well as on the required support of PhGS wellbeing, align with the key components required to maintain the core values of PhD education.<sup>21</sup>

Furthermore, international PhGS reported some specific challenges related to their financial issues, i.e., if not supported by the program during the summer, they were not allowed to work outside of the campus; visa bans issues in effect during the pandemic; additional stress for their families and not being able to go back in their home countries. Thus, graduate programs should consider each student’s specifics individually to have a more optimal approach. Similar to this suggestion, a more student-centered approach is recommended by a review of 17 studies on doctoral students’ wellness.<sup>22</sup>

This study’s results reveal PhGS challenges similar to other disciplines’ graduate students regarding emotional and psychological experiences.<sup>23,24</sup> Additionally, it was estimated that the prevalence of major depressive disorder among graduate students was two times higher in 2020 compared to 2019.<sup>25</sup> Therefore, acknowledging the challenged mental health of graduate students during the pandemic and developing appropriate strategies by utilizing a student-centered approach should be a key factor of graduate programs leadership’ plan in overcoming the imposed challenges by the COVID-19 pandemic.

Also, as the teaching mode adaption was a requirement to ensure an education continuum during the pandemic, preexisting problems were revealed to influence the students’ experiences,<sup>26</sup> thus enhancing a need

for mentorship and academic support beyond the pandemic. Furthermore, the pandemic impact on different areas of research<sup>27,28</sup> was confirmed with this qualitative study findings on PhGS, revealing cancelation or research project modification.

These results have been used to develop 18 recommendations for pharmacy graduate programs outlined in Table 2 to provide guidance and support to help the PhGS face challenges they might have during this time and into the future. Moreover, considering the specific challenges of international PhGS vs. domestic PhGS and different challenges depending on PhGS’ stage in their doctoral studies, this information can be used to guide appropriate approaches for each PhGS stratum.

This study has several limitations. First, the study sample is representative of six different universities and eight different graduate programs across the U.S. Thus, the results of this study should be applied with caution since this sample may be representatively limited when compared to other non-participating graduate programs. Also, the participants of the study were volunteers and were not given any type of

**Table 2**  
PhGS’ suggestions for improving the teaching process and facilitating students’ academic growth in the context of the COVID-19 Pandemic.

| Themes                            | PhGS’ suggestions   |
|-----------------------------------|---|
| Classes                           | Make the online classes as interactive as possible<br>Be accessible and responsive to students through e-mail, office hours, and regular check-ins  |
| Communication                     | Ask department chairs to filter and re-send important e-mail communications from the institution to make sure students do not miss important information<br>Have frank and open conversations about the students’ concerns regarding things such as graduation delays due to stay at home orders and other COVID-19 restrictions<br>Point out to students the changes/adaptations made in the syllabus due to the pandemic (ex. the number of assignments, quizzes, exams, presentations)   |
| Acknowledge needs                 | Manage expectations around work performance and consider factors such as stress, anxiety, mental health, and the living situation of the students<br>Take time to specifically acknowledge students’ work by writing encouraging words in replying to students’ e-mails   |
| Student-centered approach         | Conduct polls and surveys with PhGS’ about going back to classes, using their office spaces, in addition to reaching out to them directly for an individualized approach<br>Develop a targeted approach for engaging with and helping international PhGS, in particular, for advising them about the implications for international travel and department policies<br>Make a point to have one-on-one advisory conversations with students rather than relying on group check-in calls  |
| Mentorship & non-academic support | Continue to cultivate and practice good mentorship relationships with adaptations as needed for the COVID-19 context (ex. how to conduct job searches and interviews during a pandemic)<br>Offer non-academic support (i.e., asking students about their living situation, about their health, and offering to discuss any other matter they may need assistance with)  |
| Departmental environment          | Create a departmental culture that ensures students are free to express their concerns, challenges, and issues and offer help rather than comparing them with the other students who may not be experiencing the same issues<br>Actively maintain collaborative research environments (ex. organizing seminars with guest speakers to have students exposed to other types of research from their own)<br>Organize more online social events to help maintain social contact amongst students and faculty<br>Send a symbolic gift (i.e., a postcard, a sticker) to PhGS as an acknowledgment of their work during the COVID-19 pandemic |

incentives. Thereby, the study sample might be subjected to selection bias. However, all participants of this study talked about their cohorts and other graduate students in their departments, giving an overall perception of the students in their departments, as well as individual experiences during the pandemic and before the pandemic. The study participants represented laboratory- and non-laboratory- based research, gender diversity, and dispersion across academic years in the PhD program. This broadness of the sample has helped to bolster the transferability of both the findings and recommendations to the graduate programs of other schools and colleges of pharmacy, which may not have been represented within the specific sample.<sup>29</sup>

Graduate studies should not only be a process where hard-working, passionate individuals grow academically but should also serve as a place of building professional relationships. A vital role in this is having professors, faculty advisors, and potential mentors, who, through encouraging open communication and offering academic and non-academic support, develop future colleagues who can continue to build upon the scientific foundations of disciplines within the field of pharmacy.

Further research should explore PhGS's challenges in a one-year timeline and evaluate their experiences in order to extract recommendations for the future. Also, studies focusing on professors' experiences during the pandemic might help better understand both the positions and have a clearer picture of the adjustments needed.

## Conclusion

PhGS' wellness was perceived as challenged during the COVID-19 pandemic, enhancing specifically the need for non-academic support from their respective departments. Graduate programs should consider developing a robust system that would encourage and maintain functional advisor-student relationships and promote mentorship programs to facilitate the graduate students' path throughout their doctoral studies during the pandemic and after the pandemic is over.

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## CRedit authorship contribution statement

**Hyllore Imeri:** conceptualization, methodology, software, validation, formal analysis, investigation, data curation, writing – original draft, writing – review & editing, visualization, project administration. **Saumil Jadhav:** conceptualization, software, validation, formal analysis, data curation, writing-original draft, writing-review & editing. **Marie Barnard:** validation, writing – review & editing. **Meagen Rosenthal:** conceptualization, software, validation, formal analysis, data curation, writing - original draft, writing-review & editing, supervision.

## Declaration of competing interest

Authors declare no known conflicts of interest.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.sapharm.2021.02.016>.

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