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Pharmacy

Impact of COVID-19 on the Academic Performance of Graduate Healthcare Students

Aya Alwan[1], Anita Chabo[1], Mahmoud Al Atia[1], Yelena Sahakian[1], Mohd. Shahid[1], Rahul Deshmukh[1], Ateequr Rahman[1*]

[1]College of Pharmacy, Rosalind Franklin University of Medicine and Sciences, North Chicago, IL, 60064

*Corresponding author: Ateequr Rahman
College of Pharmacy, Rosalind Franklin University of Medicine and Sciences, North Chicago, IL, 60064

Abstract		Original Research Article

The aim of this study was to assess the impact of COVID-19 on graduate healthcare students' academic performance. The study was conducted among graduate students enrolled at Rosalind Franklin University of Medicine & Science (RFUMS). Students' responses varied by demographics, and COVID impacted the majority of students both financially and academically.
Keywords: COVID, Academic Performance, Graduate Students, Health Care.

INTRODUCTION

The COVID-19 pandemic caused immense loss of human life worldwide and introduced an unprecedented obstacle to public health, economics, and the realm of employment. The center for disease control and prevention announced the outbreak of the pandemic in January 2020 [1]. As of November 2023, there have been 722,166,517 confirmed cases and 6,981,263 deaths worldwide [2]. The economic and social disruption resulting from the pandemic was catastrophic, tens of millions of people were subjected to extreme financial and academic hardships, resulting in isolation and anxiety [3]. The uncertainty that came with COVID's onset has caused undue stress on students. They were both afraid for themselves and for their families to contract the disease. They were also frustrated with the change in the teaching method, increasing workload, ambiguity about course expectations, and concerns about finishing the academic year successfully [4]. Additionally, students began to have a decline in their social and emotional wellbeing, intellectuality, concentration on their studies, and understanding of the material [5]. Significant decline was observed in students' emotional stability during transition to online learning platforms [6]. Not only did the pandemic impact the student's mental wellbeing, but it also challenged their financial status. It resulted in loss of jobs and fewer working hours, although some students ended up working overtime to support their family members. Some students had to continue working despite being in contact with someone who tested positive for COVID which indicated their dire necessity to maintain their jobs. In all cases students experienced hardships in paying rent, utility bills, and obtaining healthy food [7]. Loss of jobs and reduction in incomes of students or family members who supported them also impacted the students' ability to continue their education as planned. The impact was amplified by socioeconomic factors where lower-income students were forced to delay graduation due to COVID-19 compared to their more affluent peers [8]. This may have also been due to lower income and first-generation students reporting reduced access to space and a quiet environment for their schoolwork [9]. Moreover, undocumented families were financially impacted by the pandemic and were not able to receive federal and/or state pandemic relief funds impeding their ability to support financially towards their children's education. Furthermore, many undocumented college students did not receive financial support from the CARES Act Higher Education Emergency Relief (HEERF) funds [10]. The COVID-19 caused a decline of education opportunities for students on different levels such as having a hard time joining online classes due to lack of accessibility, network issues, and inadequate facilities [11]. Furthermore, the pandemic created nonacademic issues outside the classrooms such as the need to purchase advanced computers and software. Apart from this, the lockdown pushed education to virtual platforms which was manageable for some courses but was almost impossible for classes that heavily relied on hands-on experience. Graduate and postdoctoral students could not take part in their research

programs as the labs were closing down and those who were nearing their graduation were forced to use the uncompleted data to write their thesis or encounter delays [12].

Students' performance in their courses is dependent on the set of skills they employ while studying. Time management and the students' abilities to multitask are ranked as the crucial components for positive academic outcomes [13, 14]. This was prominent amongst individuals with demanding jobs, or with students who were parents with family responsibilities [14]. In addition to time management, time spent studying has an impact on academic achievement. Students who studied for eight to nine hours straight were more likely to fatigue and experience burnout. This has led to poor exam performance compared to those who took breaks in between their studying [13]. A student's motivation level is also a key determinant of their performance. Students who are motivated to get good jobs after graduating were found to have better performance in their courses [15]. This was attributed to them setting realistic goals which they were able to follow through. There is a plethora of other interpersonal factors which may impact academic achievement, these may include but are not limited to lack of motivation to make a serious effort to learn and understand the course, knowledge overload, emotional problems, and poor teaching skills of the professor [14]. Additionally, academic performance may also be influenced by extrinsic factors such as course load and financial abilities. Students may enhance their academic performance by improving their time management strategies, forming study groups following lectures to review the materials, learning effective memorization techniques, reading/thinking aloud, knowing one's maximum concentration span, and managing their procrastination habits [16]. Overall COVID-19 had impacted the factors which were discussed above leading to an alteration in students' academic performances.

Despite the fact that time management and studying strategies affect academic progression, various demographic factors including race/ethnicity, gender, socioeconomic groups, and parental education level also have a significant impact on the academic performance of college students. Vaccine hesitancy and resistance to receive COVID-19 vaccination among various communities, notably, among African Americans. There was a substantial manifestation of vaccine hesitancy among this group, compounded by poor accessibility to vaccinations. This resulted in higher COVID-19 cases among African American students, impacting their academic performance and requiring remedial action in some classes [17]. Although, the pandemic was not the single causative agent of this poorer performance, it was a factor that exacerbated a historical disparity. Hispanic and African American students were observed to have significantly lower grade performance compared to white and Asian students, possibly due to socioeconomic disparities in education. African American and Hispanic students are more likely to attend for-profit colleges which spend less per student compared to non-profit schools which are usually attended by white students. This is associated with lower quality of education as the amount spent by the school per student is proportional to the quality of education provided [18]. Additionally, Hispanic males along with African American males and females were less likely to graduate on time compared to students from other racial groups [19].

There are a variety of factors that can impact the academic performance of college students. This study explored demographic factors including race/ethnicity, gender, socioeconomic status, financial difficulties, and its impact on academic progression. The objective of this study was to assess the impact of COVID-19 on the academic performance of graduate healthcare students.

MATERIAL AND METHODS
A survey was developed by the pharmacy program faculty and students which was administered to the entire student body of Rosalind Franklin University of Medicine and Science (RFUMS) by email. The student body included students from the colleges of medicine, podiatry, pharmacy, health professions, and postdoctoral studies. The survey consisted of 17 Likert-scale questions, including demographic, enrolled program, and year of graduation. In addition, questions regarding financial aid reception from government and school, the impact of COVID on job loss on students and family members, and items related to the overall impact of COVID on academic year performance. The students were asked to rate their agreement on a scale from "strongly disagree" to "strongly agree."

Using responses based on a Likert scale, the students completed a self-administered questionnaire designed to test the research objectives. The questionnaire was assessed for flow and format of the various types of instruction and on the respondents' comprehension of the words used in the questionnaire. Ten students were given the survey to take in two different occasions for a pre and post-test to assess the understanding of the questions and duration to complete the survey. An a priori level of 80% or greater consensus among the respondents was set and accepted. The reading comprehension difficulty of the questionnaire was measured in terms of the Flesch reading ease score and the Flesch–Kincaid grade level. An a priori grade level of 9 or less was set. The Flesch reading ease score was found to be 43.2 (corresponding to "fairly difficult") and the Flesch–Kincaid grade level was found to be 8.3. The Likert-type scale was tested for reliability on the pre-test and post-test using Cronbach's coefficient α, where α was 0.91 for the pre-test group and 0.95 for the post-test group. Most educational tests have a reliability of 0.40–0.95 with scores greater than 0.9 generally indicating excellent reliability and internal consistency. Surveys were emailed out to all students at RFUMS in

spring of 2022. Participation in the survey was anonymous and voluntary. No incentives were provided to complete the survey or to participate in this study. There were no exclusion criteria. Surveys that returned blank were not included in the data analysis. The data was analyzed using descriptive statistics and chi-square test by using Statistical Package for Social Scientists

(SPSS)®. This study was reviewed and designated exempt from RFUMS' Institutional Review Board (IRB).

RESULTS

| Table 1. Students' Demographics		
Variable	Frequency	Percentage
Gender		
Male	802	57.6
Female	590	42.4
Race		
Caucasian	630	45.2
Hispanic	120	8.6
African American	240	17.2
Asian	402	28.9
Age		
20-22	101	7.3%
23-26	827	59.4%
27-30	121	8.7%
31 and up	343	24.6%
Healthcare program		
CMS	448	32.2
College of Health Professions	224	16.1
COP	308	22.1
Scholl College	112	8.0
SGPS	108	7.8
Other	192	13.8
Year of Graduation		
2022	180	12.9
2023	420	30.2
2024	507	36.4
2025	285	20.5
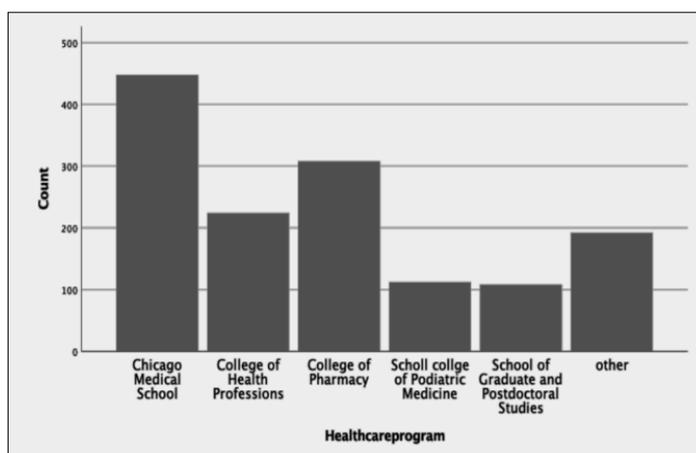
Table 1

Table 2: COVID-19 Influence on Student's Academic and Financial Status

	Gender P value	Race P value	Age P value	Healthcare program	Year of graduation	Mean (SD)
Recipient of financial aid	0.902	0.243	0.470	0.092	<.001	1.52 ± 0.499
Student's financial status	0.559	0.983	0.131	1.000	0.610	2.30 ± 1.355
Impact on student's job prospect	0.469	0.852	0.001	<.001	<.001	2.21 ± 1.334
Impact of family's job prospect	0.228	0.878	0.001	<.001	<.001	2.22 ± 1.334
Recipient of government economic benefit	0.024	0.864	0.001	0.657	0.372	1.59 ± 0.491
Recipient of school economic benefit	0.024	0.864	0.001	0.657	0.372	1.59 ± 0.491
Need to seek additional jobs	0.024	0.864	0.001	0.657	0.372	1.59 ± 0.491
Course failure	0.228	0.001	0.001	0.001	0.001	2.22 ± 1.334
Course remediation	0.001	0.878	0.001	0.001	0.001	2.09 ± 1.276
Failure to progress to next academic year	0.682	0.056	0.100	0.910	0.747	2.03 ± 1.289
Impacted GPA	0.985	0.003	0.001	0.993	0.750	2.05 ± 1.318
Academic probation	0.726	0.034	0.001	0.550	0.090	2.04 ± 1.314

A total of 1392 students participated in the study, representing 58% of the entire student population at RFUMS. The respondents comprised 57.5% males and 42.4% females, with a diverse racial distribution: 45.2% identified as white, 8.6% as Hispanic, 17.2% as African American, and 28.9% as Asian. Participants also varied by their age, 7.3% were within the range of 20-22, 59.4% in the 23-26 age group, 8.7% in the 27-30 range, and 24.6% were 30 years and older. Responses were

collected from all schools within the institution, but the majority of the respondents were from the medical school (32.2%) followed by the college of pharmacy (22.1%). The class of 2024 had the highest response rate (36.4%) while the class of 2022 had the lowest (12.9%). These demographic and institutional characteristics provide a comprehensive overview of our survey participants, highlighting the diversity and representation within the student body.

The cross-tabulation analysis examining the association between gender and various survey variables revealed a statistically significant relationship between gender and the receipt of government and school economic benefits. Additionally, a significant association was identified between gender and course remediation (p = 0.001). On the other hand, no significant relationships were observed between gender and other variables, such as financial aid, academic probation, or course failure.

While no significant relationships were identified between race and various aspects such as financial aid, economic benefits, or job prospects, compelling disparities surfaced in academic outcomes. Notably, race exhibited statistically significant associations with course failure (p = 0.001), impacted GPA (p = 0.003), and academic probation (p = 0.034).

Age exhibited remarkable relationships with various academic and economic factors. Notably, statistically significant relationships were identified between age and impact on both student and family job prospects, the receipt of government and school economic benefits, and the necessity to seek additional jobs (p = 0.001). Furthermore, age demonstrated significant associations with academic performance indicators, including course failure, course remediation, impacted GPA, and academic probation (p = 0.001).

Healthcare program affiliation demonstrated highly significant associations with the impact on both student and family job prospects (p <0.001). Moreover, significant associations between the program a student was in and their academic outcomes, including course failure, course remediation, and impacted GPA (p = 0.001).

There was a significant difference between the year of graduation and the receipt of financial aid, the impact on both student and family job prospects, and the occurrence of course failure and remediation (p = <0.001).

DISCUSSION

Most students regardless of their ethnicity, gender, and age were impacted by COVID-19 both academically and financially. Gender emerged as a discerning factor, showcasing significant associations with economic support and academic outcomes. Notably, male students were more likely to receive government and school economic benefits, while also exhibiting a correlation with the need for course remediation. This could be because male students typically are the sole provider for their families including financial, healthcare, and other needs. Additionally, male students typically feel responsible to support their families due to various cultural and social backgrounds. This indicates that gender may play a role in determining eligibility for

economic support from external sources and educational institutions. Age, as a multifaceted variable, revealed substantial relationships across economic, career, and academic domains. Older students were more likely to face challenges such as the need for additional jobs, impacting both job prospects and academic performance. They are not normally supported by their families, whereas their younger counterparts could be receiving financial, emotional, and in-kind support from their parents. In addition, older students may have responsibilities to support their families including extended families in some cases. Older students tend to seek financial stability, are more aware of the financial risks and the value of investments. Furthermore, not having the buffer of savings, may induce a sense of insecurity and apprehensions amongst them. Moreover, older students may have felt pressured to meet the timeline of their planned career which limited the flexibility to alter their plans. Whereas the younger students could have been in a better position to respond to the COVID crisis by modifying their career pathways.

On the other hand, race displayed pronounced associations with academic outcomes, indicating that racial backgrounds might play a role in shaping students' performance and progression. Black and Hispanic students are traditionally disadvantaged by poor socioeconomic backgrounds, which may have hindered their ability to respond to the COVID crisis. The need to take additional jobs, finding other means to support themselves and their families, the loss of family members' jobs, and the loss or hospitalization of a family member, may have adversely impacted their focus on studies resulting in higher rates of course failure, lower GPA, and academic probation. The anticipated year of graduation, while significantly linked to financial aid and academic outcomes, did not exhibit notable relationships with economic benefits or the need for additional jobs.

These findings indicate the apprehensions and insecurity of students toward future job opportunities as a consequence of COVID-19. Additionally, COVID-19 impacted student progression, remediation, and course failure rates. This demonstrates that colleges and universities would greatly benefit from implementing a plan of action to address students' academic progression during potential future calamities.

CONCLUSION

The diverse array of findings underscores the importance of considering multiple demographic factors when designing interventions and support systems tailored to the unique needs of different student populations. One of the limitations of the study was that it was a self-reported survey and the results cannot be generalized since the study was performed at one institution.

The impact of COVID-19 on students should serve as a caution to encourage institutions of higher

learning and policy makers to develop emergency protocols to address the financial and academic needs of students. The Center of Disease Control and Prevention (CDC) recommends strategies for daily operations for schools to prevent the spread of communicable diseases, including COVID-19 [19]. Adherence to CDC strategies would help alleviate the hardships that students may experience when facing another crisis. Additionally, providing more resources to minority students with socioeconomic disparities would improve their success in college and universities. Students also can benefit from academic support, counseling services, and mental health support. Although COVID-19 impacted students academically and financially, further research is needed to explicitly assess and quantify the impact of COVID-19 on graduate healthcare students.

REFERENCES

1. Northwestern Medicine. Covid-19 pandemic timeline. Northwestern Medicine. Accessed November 27, 2023. https://www.nm.org/healthbeat/medical-advances/new-therapies-and-drug-trials/covid-19-pandemic-timeline#:~:text=Though%20initially%20discovered%20in%20Wuhan,nation%20of%20the%20outbreak%20abroad.
2. Who coronavirus (COVID-19) dashboard. World Health Organization. Accessed November 27, 2023. https://covid19.who.int/.
3. How has Covid Affected College students?: BestColleges. BestColleges.com. Accessed November 27, 2023. https://www.bestcolleges.com/research/how-has-covid-affected-college-students/#:~:text=Pandemic%20Effects%20on%20Students,-Mental%20health%20challenges&text=According%20to%20a%20BestColleges%20survey,anxiety%2C%20and%20lack%20of%20focus.
4. Tasso, A. F., Hisli Sahin, N., & San Roman, G. J. (2021). COVID-19 disruption on college students: Academic and socioemotional implications. *Psychological Trauma: Theory, Research, Practice, and Policy*, *13*(1), 9. doi:10.1037/tra0000996.
5. Imeri, H., Jadhav, S., Barnard, M., & Rosenthal, M. (2021). Mapping the impact of the COVID-19 pandemic on pharmacy graduate students' wellness. *Research in Social and Administrative Pharmacy*, *17*(11), 1962-1967. doi: 10.1016/j.sapharm.2021.02.016.
6. Hagemeier, N. E., & Dowling-McClay, K. (2021). The Impact of Transitions Related to COVID-19 on Pharmacy Student Well-being. *American Journal of Pharmaceutical Education, 85*(4), 267-274.
7. López-Castro, T., Brandt, L., Anthonipillai, N. J., Espinosa, A., & Melara, R. (2021). Experiences, impacts and mental health functioning during a COVID-19 outbreak and lockdown: Data from a diverse New York City sample of college students. *PloS one*, *16*(4), e0249768.
8. Aucejo, E. M., French, J., Araya, M. P. U., & Zafar, B. (2020). The impact of COVID-19 on student experiences and expectations: Evidence from a survey. *Journal of public economics*, *191*, 104271. doi: 10.1016/j.jpubeco.2020.104271.
9. Kiebler, J. M., & Stewart, A. J. (2022). Student experiences of the COVID-19 pandemic: Perspectives from first-generation/lower-income students and others. *Analyses of Social Issues and Public Policy*, *22*(1), 198-224. https://doi.org/10.1111/asap.12288
10. Martinez Jr, E., Barraza, E., & Paredes, A. D. (2022). Transitioning during a pandemic: Examining the institutional response to the COVID-19 pandemic for Latina/o/x first year and new transfer students. *Journal of Latinos and Education*, *21*(3), 289-303. DOI: 10.1080/15348431.2022.2052295.
11. Author links open overlay panelEl-Sayed Atlam a, a, b, c, d, AbstractCOVID-19 was first discovered in Wuhan. A new approach in identifying the psychological impact of covid-19 on university student's Academic Performance. Alexandria Engineering Journal. October 30, 2021. Accessed November 19, 2023. https://www.sciencedirect.com/science/article/pii/S1110016821007171.
12. Suart, C., Nowlan Suart, T., Graham, K., & Truant, R. (2021). When the labs closed: Graduate students' and postdoctoral fellows' experiences of disrupted research during the COVID-19 pandemic. *Facets*, *6*(1), 966-997. doi:10.1139/facets-2020-0077.
13. Sansgiry, S. S., Bhosle, M., & Sail, K. (2006). Factors that affect academic performance among pharmacy students. *American journal of pharmaceutical education*, *70*(5). doi:10.5688/aj7005104.
14. Hashim, R., Hameed, S., Ayyub, A., Ali, S., & Raza, G. (2014). WHAT WENT WRONG: WHY DID I FAIL: Why Did I Fail?. *Pakistan Armed Forces Medical Journal*, *64*(2), 343-46. https://search-ebscohostcom.rosalindfranklin.idm.oclc.org/login.aspx?direct=true&db=a9h&AN=99420736&site=ehost-live&scope=site
15. Carroll, D., Ng, E., & Birch, D. (2009). Retention and progression of postgraduate business students: An Australian perspective. *Open Learning: The Journal of Open, Distance and e-Learning*, *24*(3), 197-209. doi:10.1080/02680510903201599.
16. Sansgiry, S. S., Kawatkar, A. A., Dutta, A. P., & Bhosle, M. J. (2004). Predictors of Academic Performance at Two Universities: The Effects of Academic Progression. *American Journal of Pharmaceutical Education*, *68*(4). doi:10.5688/aj680410.
17. Okoro, O., Kennedy, J., & Simmons, G. Jr. (2022). Exploring the Scope and Dimensions of Vaccine

Hesitancy and Resistance to Enhance COVID-19 Vaccination in Black Communities. *J. Racial Ethn Health Disparities*, 9(6), 2117-2130. doi:10.1007/s40615-021-01150-0

18. Libassi, C. T. (2018). he Neglected College Race Gap: Racial Disparities among College Completers: Accessed August 18, 2021. https://cdn.americanprogress.org/content/uploads/2 018/05/22135501/CollegeCompletions-Brief1.pdf?_ga=2.16780720.867692383.16294334 14-1936186308.1628558163]

19. Massey, D. S., & Probasco, L. (2010). Divergent streams: Race-gender achievement gaps at selective colleges and universities. *Du Bois Review: Social Science Research on Race*, 7(1), 219-246. doi: 10.1017/s1742058x10000160.