



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Currents in Pharmacy Teaching and Learning

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



Research Paper

Impact of COVID-19 on the academic performance and mental health of HBCU pharmacy students

Antonio J. Carrion^{a,*}, Asia Ridley^b, Azeezat A. Rasaki^b, Briana Journee^a, Tamara A. McCants^c

^a Pharmacy Practice, Florida Agricultural and Mechanical University, College of Pharmacy and Pharmaceutical Sciences, Tallahassee, FL 32307, United States

^b Florida Agricultural and Mechanical University, College of Pharmacy and Pharmaceutical Sciences, Tallahassee, FL 32307, United States

^c Pharmacy Practice, College of Pharmacy, Howard University, Washington, DC 20059, United States



ARTICLE INFO

Keywords:

COVID-19
HBCU
Pharmacy students
Academic performance
Mental health

ABSTRACT

Introduction: The COVID-19 pandemic has increased the use of distance learning, which may hinder academic success. Moreover, students at Historically Black Colleges and Universities (HBCUs) have been adversely affected by COVID-19. The purpose of this study was to assess the impact of online/hybrid learning on the academic performance and mental health of HBCU pharmacy students during COVID-19.

Methods: A survey was developed to assess how COVID-19 affected the mental health and academic performance of pharmacy students who attend a HBCU. The survey collected demographic information and student responses using a Likert-type, multiple-choice, and select all that apply questions.

Results: Most participants were women, African American, unemployed, and between the ages of 18 to 25. Most students did not experience a confirmed case of COVID-19 while enrolled. The majority of participants self-identified as visual learners, and most students somewhat or strongly agreed that online learning created a feeling of isolation from teachers and classmates. Furthermore, most students somewhat or strongly agreed that online learning during COVID-19 negatively affected their stress levels and mental health. Many students also disagreed that the faculty displayed empathy towards students during the COVID-19 pandemic.

Conclusions: Though most students felt isolated and changed their study habits during COVID-19, they were allowed to freely manage their time and did not find it more challenging to learn and retain information. Unfortunately, mental health and stress levels were negatively impacted, and there was a significant number of students that felt there was a lack of empathy from faculty members.

Introduction

The COVID-19 pandemic has forced the world to make many adjustments, including all pharmacy programs across the United States. To minimize the spread of COVID-19 among students, faculty, and staff, the provision of didactic and experiential education has

* Corresponding author.

E-mail addresses: Antonio.carrion@famou.edu (A.J. Carrion), Asia1.ridley@famou.edu (A. Ridley), Azeezat1.rasaki@famou.edu (A.A. Rasaki), Briana.journee@famou.edu (B. Journee), Tamara.foreman@howard.edu (T.A. McCants).

<https://doi.org/10.1016/j.cptl.2023.02.017>

undergone a massive alteration by incorporating alternate learning strategies, distancing learning, and use of technology.^{1,2} In turn, standard curricula delivery is impossible, and pharmacy courses have almost entirely shifted to an online/hybrid learning format. At the start of the pandemic, a significant amount of research highlighted administrative changes to the educational system rather than reporting on students' perspectives.² However, students who are not accustomed to distance learning or to not having an in-person educational experience may find it difficult to endure and be successful academically. One study conducted at one of the largest institutions in the nation found that many students had to adjust the amount of time spent studying and were at an increased risk of delayed graduation during the pandemic.³ Students at some institutions have reported a lack of awareness of what support their university is offering. Moreover, Historically Black Colleges and Universities (HBCUs) are predominantly attended by minority students. Some research has projected that, "learning loss will probably be greatest among low-income, black, and Hispanic students."⁴ Claims have also stated "black, Hispanic, and low-income students are at higher risk of not receiving remote instruction of average or above-average quality" and "the educational losses caused by COVID-19 could hurt long-term GDP [gross domestic product] growth."⁴

Some studies have assessed the impact of COVID-19 in students pursuing healthcare-related professions (i.e. medical students, dental students, orthopedic students).^{1,5-7} However there has been less research on the pandemic's impact on pharmacy students. Pharmacists play a critical role in the health care system and are considered among the most trusted and accessible health care professionals. Therefore, students continuing their pharmacy education during this pandemic must maintain their health and excel academically to become successful contributing members of the healthcare system. Florida A&M University (FAMU) is a public HBCU that contributes to a significant number of pharmacists entering the workforce each year. The purpose of this study was to assess the impact of online/hybrid learning on the academic performance and mental health of these HBCU pharmacy students during COVID-19.

Methods

A multi-point survey was developed by the principal and co-investigators and administered via QualtricsSM (SAP) to assess how COVID-19 has affected the mental health and academic performance of pharmacy students who attend a HBCU. The survey was open for 12 weeks and generally took 10 min to complete. There were 37 Likert-type, multiple-choice, and/or select all that apply questions on the survey. The survey was divided into eight subcategories that included baseline characteristics, COVID-19 specifics, learning

Table 1
Baseline characteristics (*n* = 109).

Characteristic	n (%)
Gender	
Male	21 (19.27)
Female	87 (79.82)
Non-binary/third gender	1 (0.92)
Prefer not to say	0 (0)
Race/ethnicity	
Asian	9 (7.96)
Black/African American	88 (77.88)
Hispanic/Latino	4 (3.54)
White/Caucasian	11 (9.73)
Other	1 (0.88)
Age (years)	
18–25	76 (68.81)
26–30	17 (15.60)
31–39	14 (12.84)
≥ 40	3 (2.75)
Campus	
Tallahassee	97 (88.99)
Crestview	12 (11.01)
Pharmacy year	
First	7 (6.42)
Second	33 (30.28)
Third	28 (25.69)
Fourth	41 (37.61)
Employment	
Part-time employment	41 (37.61)
Full-time employment	11 (10.09)
Not currently working	57 (52.29)
Number of people in the household	
1	19 (17.43)
2–3	57 (52.29)
4–6	31 (28.44)
> 6	2 (1.83)
Number of children	
0	94 (86.24)
1–2	13 (11.93)
≥ 3	2 (1.83)

style and personality type, attitudes and motivation towards online learning, study habits, grades and perceived workload, health, and faculty empathy.

Inclusion criteria consisted of professional pharmacy students aged ≥ 18 students enrolled at FAMU College of Pharmacy and Pharmaceutical Sciences, Institute of Public Health. Students < 18 years old, not enrolled at FAMU, or not pursuing a doctor of pharmacy degree were excluded. Students who agreed to participate signed an informed consent agreement, and the overall project was approved by the FAMU Institutional Review Board. Participants were told that the study was designed to assess their experience of matriculating through the program during the pandemic. At the end of the survey, students were thanked for their participation.

Results

Baseline characteristics

Between May 2021 and July 2021, we surveyed 109 pharmacy students attending FAMU from the Tallahassee and Crestview campuses. Baseline characteristics are listed in Table 1. Most participants were women ($n = 87$; 80%), African American ($n = 88$; 81%), unemployed ($n = 57$; 52%), and between the ages of 18 to 25 ($n = 75$; 69%). There was a similar distribution of participants classified as fourth year (P4) students ($n = 41$; 38%), followed by second-year (P2) ($n = 33$; 30%), third-year (P3) ($n = 28$; 26%), and first-year (P1) ($n = 7$; 6%) students. Ninety-four (86%) did not have any children. Only 17% ($n = 19$) of students lived alone. All participants answered questions 1 through 8; however, not all participants answered the remaining questions (9–37).

COVID-19 specifics

Responses to COVID-19 related factors are shown in Table 2. Eighty-nine (82%) students had not experienced a confirmed case of COVID-19 while enrolled in online courses. However, over one out of every five students (21 of 100; 21%) had lost family members or friends due to COVID-19. The majority of students had not missed any days from school for any reason related to COVID-19 (83 of 100; 83%).

Learning style/personality

Responses to learning style and personality type are shown in Table 3. The majority of participants self-identified as visual learners (47 of 100; 47%). A similar distribution of students identified as kinesthetic learners (25 of 100; 25%) compared to students requiring reading and writing to learn new information (22 of 100; 22%). Self-identified auditory learners were least prevalent among survey participants (6 of 100; 6%). Regarding personality type, over two-thirds of participants self-identified as introverts (79 of 100; 79%) as opposed to extroverts (21 of 100; 21%).

Attitudes/motivation

Responses to attitudes and motivation towards online learning are shown in Table 4. A similar distribution of students reported strongly agreeing to feeling more focused and engaged in online classes (28 of 100; 28%) as opposed to those that strongly disagreed with this statement (27 of 100; 27%). More students somewhat or strongly disagreed that they found it more challenging to learn and retain information learned in online courses (47 of 100; 47%) than students who somewhat or strongly agreed (40 of 100; 40%). Most students somewhat or strongly agreed that online learning created a feeling of isolation from teachers and classmates (55 of 100; 55%). Over two-thirds of participants somewhat or strongly agreed that online learning allowed them to learn freely and manage their own time (71 of 100; 71%). Three-quarters of participants denied having difficulty navigating the computer software required for online

Table 2
COVID-19 specifics.

Survey question	n (%)
Have you ever had a confirmed case of COVID-19 while enrolled in courses? ($n = 109$)	
Yes	20 (18.35)
No	89 (81.65)
If you tested positive for COVID-19, how have you been affected? ($n = 12$)	
Loss of smell	3 (25)
Loss of taste	9 (75)
Loss of hearing	0 (0)
Have you lost any immediate family members of friends due to COVID-19? ($n = 100$)	
Yes	21 (2)
No	79 (7)
Has COVID-19 caused you to miss days from school for any reason? If yes, how many? ($n = 100$)	
0 days	83 (83)
≤ 5 days	9 (9)
6–10 days	5 (5)
> 10 days	3 (3)

Table 3
Learning style and personality type (n = 100).

Survey question	n (%)
What is your learning preference?	
Auditory	6 (6)
Kinesthetic	25 (25)
Reading and writing	22 (22)
Visual	47 (47)
What type of courses do you prefer?	
Online	50 (50)
In-person	30 (30)
Hybrid	20 (20)
Which of the following best describes your personality?	
Introvert	79 (79)
Extrovert	21 (21)

Table 4
Attitudes and motivation (n = 100).

Survey question, n (%)	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
I am more focused & engaged in online lectures as compared to current &/or previous courses held in person	28 (28)	16 (16)	11 (11)	18 (18)	27 (27)
I find it more difficult to learn and retain the information I learned in online courses	19 (19)	21 (21)	13 (13)	16 (16)	31 (31)
I prefer taking exams in the comfort of my own home/study space as opposed to in-person	58 (58)	17 (17)	11 (11)	4 (4)	10 (10)
Online learning makes me feel isolated from my teacher and classmates	27 (27)	28 (28)	5 (5)	11 (11)	29 (29)
Online learning allows me to learn freely and manage my own time	47 (47)	24 (24)	14 (14)	11 (11)	4 (4)
I have had difficulty navigating new computer software required for online learning	3 (3)	16 (16)	6 (6)	25 (25)	50 (50)

learning (75 of 100; 75%).

Study habits

Responses to study habits are shown in [Table 5](#). The majority of students used a combination of a laptop (95 of 100; 100%), tablet/iPad (58 of 100; 58%), and/or smartphone (73 of 100; 73%) to study. Seventy-eight percent (75 of 96) of students had a designated study area in the home. A similar distribution of students confirmed and denied commuting to different study locations (50 of 96; 52% vs. 46 of 96; 48%). Forty-seven percent (45 of 96) of students believed online learning during the COVID-19 pandemic increased the amount of time they spend studying, 31% (30 of 96) believed they spent less time studying, and 22% (21 of 96) reported no change. More students reported participating in less group study (38 of 96; 40%) compared to those that reported more group study (22 of 96; 23%), no change (16 of 96; 17%), and complete lack of group study participation (20 of 96; 21%). Almost all (88 of 96; 92%) students somewhat or strongly agreed that online learning saved time commuting to school and study locations. Only 68% (65 of 96) of students somewhat or strongly agreed that they had a stable internet connection. While many (44 of 96; 46%) students somewhat or strongly disagreed that individuals in the household disrupted or distracted, others reported this to be an issue (35 of 96; 36%). Overall, 85% (82 of 96) of students believed their study habits changed during the pandemic.

Grades

Responses to grades and the perceived workload are shown in [Table 6](#). Although some students (33 of 95; 35%) reported higher grades during the pandemic, 25% (24 of 95) reported lower grades while 40% (38 of 95) reported no change in grades. Most students believed their workload increased during the pandemic (71 of 95; 75%).

Health and faculty empathy

Responses to stress levels, mental, and physical health are shown in [Table 7](#). Most students somewhat or strongly agreed that online learning during COVID-19 negatively affected their stress levels (55 of 95; 58%) and mental health (54 of 95; 57%), and 46% (44 of 95) somewhat or strongly agreed that online learning affected their physical health. Most students somewhat or strongly agreed that they found healthy ways to manage stress levels, mental, and physical health during the pandemic. Due the change in the educational environment, perceived faculty empathy was assessed during the study. Typically, students would be able to engage with faculty in-person and the use of online teaching negated this ability. Most students somewhat or strongly disagreed that the faculty had displayed

Table 5
Study habits (*n* = 96).

Survey question	n (%)
What type of electronic device(s) do you use for online courses and studying?	
Desktop computer	9 (3.80)
Laptop	95 (40.08)
Tablet/iPad	58 (24.47)
Smartphone	73 (30.8)
Other	2 (0.84)
Do you have a designated study area in your home?	
Yes	75 (78.13)
No	21 (21.88)
Do you ever commute/travel to a different study location?	
Yes	50 (52.08)
No	46 (47.92)
How has online learning during the COVID-19 pandemic affected the amount of time you dedicate to studying per week?	
It has increased the amount of time I have spent studying	45 (46.88)
It has decreased the amount of time I have spent studying	30 (31.25)
The amount of time I study has remained relatively the same	21 (21.88)
How has online learning during the COVID-19 pandemic affected the amount of time you participate in group study per week?	
It has increased the amount of time I have spent participating in group study	22 (22.92)
It has decreased the amount of time I have spent participating in group study	38 (39.58)
The amount of time I participate in group study has remained relatively the same	16 (16.67)
I do not participate in group study at all	20 (20.83)
Online learning saves time spent commuting to school and/or study locations	
Strongly agree	74 (77.08)
Somewhat agree	14 (14.58)
Neither agree nor disagree	5 (5.21)
Somewhat disagree	0 (0)
Strongly disagree	3 (3.13)
I have a stable/trustworthy internet connection	
Strongly agree	34 (35.42)
Somewhat agree	31 (32.99)
Neither agree nor disagree	10 (10.42)
Somewhat disagree	18 (18.75)
Strongly disagree	3 (3.13)
The people in my household distract me while I am in my study area or workplace	
Strongly agree	14 (14.58)
Somewhat agree	21 (21.88)
Neither agree nor disagree	17 (17.71)
Somewhat disagree	13 (13.54)
Strongly disagree	31 (32.29)
My study habits have changed for online courses in comparison to before the pandemic	
Strongly agree	61 (63.54)
Somewhat agree	21 (21.88)
Neither agree nor disagree	8 (8.33)
Somewhat disagree	2 (2.08)
Strongly disagree	4 (4.17)

Table 6
Grades and workload (*n* = 95).

Survey question	n (%)
How has COVID-19 affected your grades as compared to semesters prior to the pandemic?	
My grades were higher	33 (34.74)
My grades were lower	24 (25.26)
My grades have remained relatively the same	38 (40)
How has COVID-19 affected your workload in your courses?	
I believe my workload has increased	71 (74.74)
I believe my workload has decreased	3 (3.16)
I believe my workload has remained relatively the same	21 (22.11)

empathy towards students during the COVID-19 pandemic (68 of 95; 72%).

Discussion

This study was successful in assessing the impact of online/hybrid learning on the academic performance and mental health of HBCU pharmacy students during COVID-19. Most participants in this study were women, Black/African American, unemployed, and

Table 7
Health and faculty empathy.

Survey question, n (%)	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Online learning during COVID-19 has negatively affected my stress levels.	35 (36.84)	20 (21.05)	13 (13.68)	11 (11.58)	16 (16.84)
Online learning during COVID-19 has negatively affected my mental health.	30 (31.58)	24 (25.26)	16 (16.84)	4 (4.21)	21 (22.11)
Online learning during COVID-19 has negatively affected my physical health.	24 (25.26)	20 (21.05)	17 (17.89)	11 (11.58)	23 (24.21)
I have found healthy ways to manage my stress levels, mental & physical health while taking courses during the pandemic.	20 (21.05)	33 (34.74)	21 (22.11)	12 (12.63)	9 (9.47)
I believe the professors/faculty at my institution have been more empathetic towards students during the COVID-19 pandemic.	4 (4.21)	9 (9.47)	14 (14.74)	13 (13.68)	55 (57.89)

between the ages of 18 to 25. The largest percentage of participants were from the P4 class, followed by the P2, P3, and P1 classes. Although, previous articles have projected and reported educational losses among minority students during the COVID-19 pandemic,³ there are several results in this study that refute such claims and suggest that students in this study performed better academically during this time or experienced no change. Most students confirmed that their grades were higher, followed by students that reported lower grades and no change in grades. As for time management, over two-thirds of participants confirmed that online learning allowed them to manage their time better. The majority of students believed their study habits changed during this period. There was no significant difference in the number of students who felt more focused and engaged in online classes than those who denied that statement or felt indifferent.

A cross tab was created to assess learning style compared to grade outcomes. The majority of auditory learners reported obtaining higher grades. The majority of kinesthetic, visual, and reading/writing learners reported that their grades remained relatively the same. When assessing mental health, the results of the survey correlate with a decrease in mental health in this study population. More than half of students confirmed that online learning during the pandemic negatively impacted their stress levels and mental health. More students confirmed feeling more isolated from teachers and classmates than those that refused. Another significant finding was that over one out of every five students had lost family members or friends due to COVID-19. The majority of students denied that they believed faculty displayed empathy towards students during the pandemic.

Limitations of this study included low participation from P1 students, timeline of survey distribution, and lack of completion of the survey from all participants. The survey opened May 2021, before the end of the spring semester, and ended in July, prior to the start of the fall semester. Students may have classified themselves according to the 2020–2021 academic year or by the classification they would matriculate to in the 2021–2022 academic year. Factors that could have influenced lack of completion of the survey included length of the survey or lack of controls to require all questions to be answered to submit responses. Areas of further study could include assessing the academic impact of COVID-19 at other predominantly White institutions or other HBCUs. The results of these two additional comparisons could be later compared to the results of this study.

Conclusions

The objective of this study was to assess the transition to online/hybrid learning's impact on the mental health and stress levels of HBCU pharmacy students. Most of the participants were P4 African American females between the ages of 18 to 25 and were unemployed. Most of the students had positive attitudes towards online learning. Though most students felt isolated and required to change their study habits, they were allowed to freely manage their time and did not find it more challenging to learn and retain information. In turn, most students reported higher grades during virtual learning. However, most students reported negative effects on their mental health and stress levels and strongly disagreed that the faculty displayed empathy during the pandemic.

The key takeaways from this assessment is that online learning did not negatively impact this population of HBCU pharmacy students academically. This differs from some research that has projected that minority students will suffer greater losses academically compared to their Caucasian counterparts.³ However in this study, students' mental health and stress levels were negatively impacted and there was a significant number of students that felt there was a lack of empathy from faculty members. The effects on online/hybrid learning during the pandemic on mental health of the students in this study were consistent with results of similar HBCU studies.^{8,9}

Disclosure(s)

None.

Author statement

- Antonio J. Carrion, PharmD, MPH, AAHIVP, CPh (Corresponding Author)
 - o Conceptualization and formulation of overarching research goals

- o Methodology and Design
- Asia Ridley
 - o Conceptualization of research goals
 - o Writing and editing of original draft and revised draft
- Azeezat Rasaki
 - o Writing and editing of revised draft
- Briana Journee, PharmD, MBA, AAHIVP, CPh
 - o Writing of original draft
- Tamara McCants, PharmD
 - o Writing of original draft

Declaration of Competing Interest

None.

References

- 1 Ferrel MN, Ryan JJ. The impact of COVID-19 on medical education. *Cureus*. 2020;12(3), e7492. <https://doi.org/10.7759/cureus.7492>.
- 2 Kawaguchi-Suzuki M, Nagai N, Akonoghre RO, Desborough JA. COVID-19 pandemic challenges and lessons learned by pharmacy educators around the globe. *Am J Pharm Educ*. 2020;84(8):8197. <https://doi.org/10.5688/ajpe8197>.
- 3 Aucejo EM, French J, Ugalde Araya MP, Zafar B. The impact of COVID-19 on student experiences and expectations: evidence from a survey. *J Public Econ*. 2020;191, 104271. <https://doi.org/10.1016/j.jpubeco.2020.104271>.
- 4 Dorn E, Hancock B, Sarakatsannis J, Viruleg E. *COVID-19 and Student Learning in the United States: The Hurt Could Last a Lifetime*. McKinsey & Company; 1 June 2020. Accessed 23 February 2023 <https://www.mckinsey.com/industries/education/our-insights/covid-19-and-student-learning-in-the-united-states-the-hurt-could-last-a-lifetime>.
- 5 Dedeilia A, Sotiropoulos MG, Hanrahan JG, Janga D, Dedeilias P, Sideris M. Medical and surgical education challenges and innovations in the COVID-19 era: a systematic review. *In Vivo*. 2020;34(3 suppl):1603–1611. <https://doi.org/10.21873/invivo.11950>.
- 6 Kogan M, Klein SE, Hannon CP, Nolte MT. Orthopaedic education during the COVID-19 pandemic. *J Am Acad Orthop Surg*. 2020;28(11):e456–e464. <https://doi.org/10.5435/JAAOS-D-20-00292>.
- 7 Machado RA, Bonan PRF, Perez DEDC, Martelli Júnior H.. COVID-19 pandemic and the impact on dental education: discussing current and future perspectives. *Braz Oral Res*. 2020;34, e083. <https://doi.org/10.1590/1807-3107bor-2020.vol34.0083>.
- 8 Lee AK, Wade J, Teixeira-Poit S, et al. Contextualizing the racial gradient in COVID-19 outcomes: narratives from HBCU students. *J Am Coll Health Publ Online*. 21 June 2022. <https://doi.org/10.1080/07448481.2022.2089849>.
- 9 Trang NL, Robinson-Warner G, Karavatas SG, et al. Fear of COVID-19 among dental students at aHistorically Black College and University (HBCU). *J Am Coll Health Publ Online*. 14 July 2022. <https://doi.org/10.1080/07448481.2022.2100997>.