

Impact of COVID-19 on the Physical Activity and Mental Health of College Students

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Abstract The COVID-19 coronavirus has presented our world with significant global challenges and instituting lockdown measures. Among those most affected were college students, who were forced to engage in social distancing; educational institutions were affected, and remote learning and recreation facilities closed their doors temporarily, including playgrounds. Recognizing the unique impact on this demographic, the researchers were interested in knowing if students participated in physical activities during lockdown and, if so, what type of behavior they engaged in. This study aimed to explore the impact of COVID-19 on college students' physical and emotional activity behavior. A qualitative study was conducted using an online Google Form among 98 students. The survey measured the overall impact on physical activities and health, virtual vs. face-to-face workouts, and the impact on psychological and social aspects, and participants most often participated in physical activities after COVID-19. Results indicate that 55.2% of individuals' physical activities decreased, only 26.5% of active individuals had no change, and 17.3% increased their overall physical activities. After COVID-19, 55.7% spent less time than before, while 23.7% spent more on physical activities. In face-to-face workouts, 60% did not attend any virtual or face-to-face workouts, 12% participated in virtual workouts, 11% participated in face-to-face workouts, and 16.3% attended virtual and face-to-face workouts. About 20% of the participants reported that they felt they were depressed due to COVID-19. About 40% of them felt stressed and socially isolated due to COVID-19. Over 20% felt lonely due to Covid-19. Our results enrich the literature on how COVID-19 impacts the physical activity behavior of college students and offer a novel reasoning to ensure student's physical behavior is understood.

Keywords: Covid-19, physical activity, mental health, college student

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1. Introduction

The COVID-19 coronavirus has presented our world with significant challenges and disruptions. These challenges and disruptions occurred in many healthcare, economic, and social systems [1]. This novel respiratory infectious disease has contributed to the morbidity and mortality of millions of people worldwide [2,3]. COVID-19 has been a significant point of concern and a topic of discussion since the early part of 2019. During the initial part of 2019 and into 2020, the coronavirus was downplayed as a mild case like the common flu and not a significant threat to people or the U.S. healthcare system [3,4]. People have pondered what a novel coronavirus is, the origin of the coronavirus, when a cure will be available, and how the coronavirus has impacted the physical behavior and activities of individuals, including college students. This research study aims to understand the impact of COVID-19 on college students' physical and emotional behavior.

We are now beyond the three-year-plus mark in this unprecedented pandemic. Although the coronavirus cases have been trending in a downward trajectory, we still face the harsh reality of new variant strands of the coronavirus [5,6]. Furthermore, the coronavirus still poses ongoing threats to human health conditions. These threats include cardiovascular complications, economic unwellness, an individual's unbalanced sense of reality, and impacts on societal norms [7,8], including effects on college students' physical activities (Need to add reference).

Some notable reality facts within the three-year mark due to the coronavirus pandemic include the alarming rate at which people displayed morbidity, complications of pre-existing health challenges, and how elective procedures have been placed on temporary hold [8]. Government health agencies and healthcare professionals have worked to mitigate COVID-19 by encouraging individuals to adhere to the health and safety guidelines, which included working from home if they were still employed, homeschooling children, and limiting the number of people they encounter daily [4,9]. Additional reality facts as a response to mitigating the COVID-19 disease, the CDC

and the WHO asked governments and tribal regions to adopt strategies including but not limited to urging individuals to practice social distancing (i.e., keep six feet apart) and encouraging them to wash their hands often or use hand sanitizer [10,11]. Moreover, faculty, staff, and college students were strongly encouraged to wear a face mask or face covering on college or university campuses [12].

Coronavirus Impact on Students' Mental Health Behavior and Substances

The coronavirus plague affects 10 to 30 percent of upper respiratory infections in adults, with symptoms ranging from fever, dyspnea, and acute cough to greater than 20 percent [3]. Additionally, less than 40 percent of individuals require mechanical ventilation for life support [3]. Older adults with compromised medical comorbidities also have a higher mortality rate. According to the World Health Organization [11], as of June 8, 2021, the confirmed global cases of COVID-19 have surpassed 173.2 million, including more than 3.7 million deaths worldwide. Shereen et al. [13] reported that individuals infected with the coronavirus might experience symptoms associated with pneumonia, a diffused alveolar, which may also lead to acute respiratory distress syndrome and even death of college students.

College students' mental health has become a target of discussion by researchers, aiming to explore the impact of COVID-19 on their mental health and physical activity behaviors [14,15]. Mental illness has negatively affected college students' academic success due to the coronavirus pandemic's onset. Moreover, students may display a loss of motivation and concentration, which has a negative impact on their psychomotor behavior [15]. In Son et al.'s [15] study, the authors used a semi-structured interview survey to assess college students' mental health status and how they coped with the COVID-19 pandemic. In comparative research by Freuhwirth et al. (2021), the authors applied the online Qualtrics survey to understand the mental health effect on college students dealing with the coronavirus pandemic, where they found that 32% of participants showed a significant increase in anxiety and depression. Additionally, in Son et al. [15] research, 71% of participants shared that they had an increased level of anxiety and stress affecting their mental health due to the COVID-19 pandemic.

Another correlated study was conducted on the impact of COVID-19 on physical activity and behaviors of college students by Jones, Manze, Ngo, Lamberson, and Freudenberg [16]. The researchers used a "cross-sectional population-based online survey as their guiding tool in their study. Their research showed that 43.2 % of students indicated that they had experienced anxiety, 42.2 % experienced depression, and 49.0 % shared a need to seek mental health services as a coping mechanism due to the novel coronavirus. The researchers also highlighted in their study that college students increased their use of substances by 13.6%, alcohol by 8.1%, marijuana by 4.0%, and tobacco by 3.4% due to the pandemic.

Coronavirus Impact on Students' Physical Activity Behavior

Participating in regular physical activities by college students is particularly important and a pivotal behavior towards improving their health and wellness [17,18,19],

even during this unprecedented time of the COVID-19 pandemic. The strict quarantine and revision towards closing campuses and switching to remote learning have imposed a lifestyle change on students, reducing physical activity behavior and psychological, cognitive, and unsettling social consequences for college students [20]. In addition to the coronavirus impact on students, a reduction in physical activity movement may have contributed negatively to students' physical health during their time in quarantine [21]. Regular participation in physical activity is critical for maintaining overall good physical health and wellness [21,22]. Physical activity is noted to have many beneficial effects on physical activity behavior, such as reduced anxiety [22,23], reduced type II diabetes [17], and prevented morbidity [21].

During the coronavirus pandemic, states, local governments, and municipalities implemented lockdown measures that directly threatened college students' physical movement behavior [4,9]. Research data propose that college students and others have participated in fewer physical activities than during the pre-coronavirus pandemic [24]. While on lockdown, college students' engagement in physical activities (walking, aerobic, and muscle strengthening) was reduced by 58.2%, and their sedentary behavior increased by 23.8 % [25]. In a correlated study, Dunton, Wang, Do, & Courtney [26] reported that students' physical activity declined between 32% and 48% during the Shelter-in-Place order. The impact of COVID-19 on the physical activity movement of individuals has also been noted in several countries, including Canada [27], Spain [25,28], Italy [29], the United States [26], and this was recognized as a global concern. The speed at which COVID-19 has spread throughout states and municipalities, the mitigation strategies used to combat the coronavirus, and its effects on college students' physical activity behavior make this a distinctive experience they will not often forget.

This study is important because it will allow unprecedented insight and a greater understanding of how the coronavirus pandemic hurts the physical behavior of college students. Generally, the study will help society prepare for future pandemics, whether it involves advancing physical education, learning new methods to remain physically active, or implementing activities to improve college students' mental and social behaviors.

2. Methods

Sample

Participants used in the study. We used college students from a Historically Black College or University in the Southeast United States area. Emails with the survey were sent to the student body in the Department of Kinesiology and Recreation Administration to solicit participation, and students voluntarily filled out the survey. Students include both undergraduate students and graduate students.

Assessment

Instrument used in the study. A survey was developed through Google Forms to investigate the impact of COVID-19 on college students' physical activity. Other

than some basic background questions, some questions related to the impact of COVID-19 on their physical activity participation were asked. Some were multiple choice questions, such as "After COVID-19 happened, overall, my physical activities have: 1). Increased 2). Decreased 3). No change", "After COVID-19 happened, I spend: 1). More time on physical activities 2). Less time on physical activities 3). No change", and "After COVID-19 happened, 1). I have attended virtual workouts 2). I have attended face-to-face workouts. 3). I have attended both virtual workouts and face-to-face workouts. 4). I have attended Neither virtual workouts nor face-to-face workouts." Several Likert scale questions were also asked related to psychological and social factors, such as "Due to COVID-19, I feel that I am depressed", "Due to COVID-19, I feel that I am stressed", and "Due to COVID-19, I feel that I am socially isolated". 1 was "Strongly disagree," and 5 was "Strongly agree."

Procedures used in the study. After the survey was developed, an Email with the survey was sent out through the department's student email list to solicit participants. A consent form was included in the first section of the survey. All students had to read the consent form and determine if they would like to participate in this study voluntarily. If they continued to fill out the questions, it would indicate that they had agreed with the consent form. The survey was anonymous, and the raw data would not be disclosed to the public other than the researchers. Three weeks after the first email, a second email was sent to solicit more participants. One month after the second email, the survey was closed. Then, we moved on to data collection and data analysis.

Data Analyses

Data Analysis used in the study. Data was first downloaded from Google Forms to Excel. The data was input into the SPSS for data analysis. Descriptive data analysis was conducted. Independent t-test analysis was conducted to compare differences between males and females on psychological and social factors at a significant level of .05.

3. Results

Table 1. Demographic Information

		N	%
Gender	Male	48	49%
	Female	50	51%
Classification	Freshmen	5	5.1%
	Sophomore	14	14.3%
	Junior	16	16.3%
	Senior	31	31.6%
	Graduate	32	32.7%
Race	African American	94	96%
	White	3	3%
	Others	1	1%
Age Range		18-59	
Total		98	

Demographic information. A total of 98 college students were used in this survey. Their ages ranged from 18 to 59 years, with an average age of 24.2 years. Of them, 51% were female, 49% male. About 32% were graduate students, and about 31% were senior students. Most were African American students (96%) (Table 1).

Overall Impact on Physical Activities and Health

Over half of the participants (55.2%) said their overall physical activities had decreased after COVID-19. 26.5% answered that there was no change, and 17.3% even increased their overall physical activities. When asked how much time they spent on physical activities after COVID-19, 55.7% answered that they spent less time than before, while 23.7% said they spent more time on physical activities. But it is good to see that only about 12% of the participants reported that their overall health conditions got worse, with 68.4% of them no change and about 19% even improved (Table 2)

After COVID-19, over 80% of the participants indicated that they mainly did physical activities alone. Only about 18% of them did physical activities, mainly with friends or family members.

Impact on Gym Workout

It is very encouraging to see that 60.4% of the participants said that they would go back to the gym for a workout if the gym opened again, while 25% were not sure if they would go back to the gym for a workout or not and about 10% said that they would not go back to the gym (Table 3).

Table 2. Overall Impact on Physical Activities and Health

	N (%)		
After COVID-19, overall, my physical activities have	Decreased 55 (55.2%)	Increased 17 (17.3%)	No Change 26 (26.5%)
After COVID-19, time spent on physical activities	Less 54 (55.1%)	More 23 (23.5%)	No change 21 (21.4%)
After COVID-19 happened, My health condition got	Worse 12 (12.2%)	Better 19 (19.4%)	No change 67 (68.4%)
After COVID-19 happened, I mainly do physical activity	By myself 79 (80.6%)	With friends 9 (9.2%)	With family members 10 (10.2%)

Table 3. Impact on Gym Workout

If gyms open again	I will go back to the gym to workout	I will NOT go back to the gym to workout	I am not sure if I will go back to the gym to workout or not	I will not go back to the gym to workout because I usually don't go to the gym anyway	Others
	58 (59.2%)	10 (10.2%)	24 (24.5%)	4 (4.1%)	2 (2%)

Participation in Virtual Workouts vs. Face-to-Face workouts

After COVID-19, over 60% of the participants reported

not attending any virtual or face-to-face workout. About 12% of the participants participated in virtual workouts, 11% participated in face-to-face workouts, and 16.3% attended virtual and face-to-face workouts (Table 4).

Table 4. Participation of Virtual Workouts vs. Face-to-Face Workouts

After COVID-19 happened, I have attended	Virtual Workouts	Face-to-face workouts	Both	None
N(%)	12 (12.2%)	11 (11.2%)	16 (16.3%)	59 (60.2%)
If you have attended virtual workouts after COVID-19 happened, how do you feel about it?	I feel that virtual workouts are good	I feel that I don't like to attend virtual workouts	I feel that virtual workouts are ok	
N (%)	24 (24.5%)	39 (39.8%)	35 (35.7%)	

Impact on Psychological and Social Aspects

Several questions were asked about the impact of COVID-19 on their psychological and social aspects. About 20% of the participants reported that they felt they were depressed due to COVID-19. About 40% of them felt stressed and socially isolated due to COVID-19. Over 20% felt lonely due to Covid-19 (Table 5)

Table 5. Impact on Psychological and Social Aspects

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Due to COVID-19, I feel that I am depressed	41 (41.8%)	13 (13.3%)	24 (24.5%)	12 (12.2%)	8 (8.2%)
Due to COVID-19, I feel that I am stressed	25 (25.5%)	5 (5.1%)	28 (28.6%)	19 (19.4%)	21 (21.4%)
Due to COVID-19, I feel that I am socially isolated	22 (22.4%)	13 (13.3%)	24 (24.5%)	18 (18.4%)	21 (21.4%)
Due to COVID-19, I feel that I am lonely	34 (34.7%)	22 (22.4%)	19 (19.4%)	8 (8.2%)	15 (15.3%)

Table 6. T-test on Psychological and Social Factors between Male and Female

		N	Mean	SD	P value
Feel Depressed	Male	48	1.98	1.176	.014*
	Female	50	2.64	1.425	
Feel Stressed	Male	48	2.67	1.419	.008**
	Female	50	3.44	1.417	
Feel Socially Isolated	Male	48	2.81	1.299	.143
	Female	50	3.24	1.559	
Feel Lonely	Male	48	2.20	1.304	.077
	Female	50	2.72	1.512	

*p<.05 ** p<.01

An Independent t-test was conducted on the psychological and social factors between males and females. Significant differences were found in feeling depressed and feeling stressed between males and females. Female college students were more likely to feel depressed and stressed than male college students due to COVID-19. Although not significantly different, female college students experienced higher levels of feeling socially isolated and lonely than male students in this study. (Table 6).

Most Often Participated in Physical Activities After COVID-19 Happened

Table 7. Most Often Participated Physical Activities After COVID-19 Happened

	N	%
Walking	72	73%
Jogging/Running	53	54%
Basketball	34	35%
Weightlifting	33	34%
Workout at gym	29	30%
Treadmill	25	26%
Yoga	23	23%
Virtual fitness class	16	16%
Football	13	13%
Face-to-face fitness class	10	10%
Swimming	9	9%

The most often participated physical activity was walking after COVID-19 happened (Table 7). Over 70% of the participants reported walking as the most common physical activity they did after COVID-19 happened. Following walking was jogging/running (54%), basketball (35%), and weightlifting (34%). It showed that about 30% of the participants still went to work out at gyms; 10% participated in face-to-face fitness classes, while about 16% chose to attend virtual fitness classes.

Physical Activities Which Participants Stopped After COVID-19 Happened

The physical activity that was stopped by most of the participants due to COVID-19 was the workout at the gym (60%) (Table 8). The other kind of physical activities that were stopped due to COVID-19 were weightlifting (35%), face-to-face fitness class (23%), basketball (21%), jogging/running (18%), and swimming (18%).

Table 8. Physical Activities Which Were Stopped Participating After Covid-19 Happened

	N	%
Workout at gym	59	60%
Weightlifting	34	35%
Face-to-Face fitness class	23	23%
Basketball	21	21%
Jogging/Running	18	18%
Swimming	18	18%
Treadmill	16	16%
Football	10	10%

4. Discussion

College students faced an interruption in their academic learning environment, areas of campus living, and facilities for physical activities. This study adds to the understanding and presents valuable data on college students' psychological, social, and physical activity factors measured after the COVID-19 pandemic lockdown. About 20% of the sample participants reported that the situation greatly impacted their mental health and wellness, and they felt depressed. In comparison, 40% of respondents reported they felt stressed and socially isolated due to COVID-19. Additionally, 20% of respondents felt lonely and engaged in self-isolation. Significant psychological differences were found in feeling depressed and stressed between males and females. Female respondents (college students) were more likely to feel depressed and stressed than male respondents. Though not significantly different, female respondents experienced higher levels of social isolation and loneliness than male respondents in this study. Nevertheless, almost all students reported following the state, municipality, and University mandates for isolation, wearing a face mask or face covering, and social distancing.

The impact on college students' physical health behavior was evident in the research study. Over half of the respondents reported decreased overall physical activities due to COVID-19. Over a quarter of participants reported no change in their physical activity behavior, and 17.3% of respondents increased their overall physical activities. When asked how much time they spent on physical activities after COVID-19, 55.7% answered that they spent less time than before, while 23.7% reported more time on physical activities. Moreover, it is good to see that only about 12% of the participants reported that their overall health conditions got worse, with 68.4% of participants reporting no change and 19% of respondents even improved. Of the participants, 70% reported walking as their most common physical activity. Following walking was jogging/running (54%), basketball (35%), and weightlifting (34%). Results indicated that about 30% of respondents still went to gyms; 10% participated in face-to-face fitness classes, while about 16% attended virtual fitness classes. This contrasts with a report by Castañeda-Babarro et al. [25] found that while on lockdown, college students reduced their walking, aerobics, and muscle strengthening, while their sedentary behavior increased. However, a coordinated study by Dunton, Wang, Do, & Courtney [26] reported that students' physical activity behavior declined during the Shelter-in-place order. The impact of COVID-19 on the physical activity behavior of individuals has also been noted in several countries, like Canada [27], Spain [25], and the United States [26], and recognized as a global worry.

Some limitations of the study should be mentioned. First, the study population comprised of college students from a single Historically Black College or University in the Southeast United States area. If probable, additional research is needed to establish whether the current findings are generalizable to other students at non-historical Black Colleges or Universities, as the experiences would likely differ significantly. Second, the sample population may not be fully representative. So, it

is unclear how generalizable the findings are to non-historical Black Colleges or University populations: the 98 survey respondents attended one university, were self-selected to participate, and were proportionally equal to males and females.

Participation in physical activities, deemed a part of health promotion, is a significant health behavior action that college students may be negatively impacted by due to the novel coronavirus pandemic (COVID-19). However, students can take this opportunity to engage in healthy activity or health promotion while away from the campus or on campus for health promotion and prevention [30]. Importantly, participation in physical activities is linked to a healthier weight [31], overall general health [32], and good quality domain (Campsen & Buboltz, 2017). Knowing the coronavirus's impact on college students, understanding their physical activity behavior pre- and post-COVID-19 pandemic, and learning techniques they can use are all steps leading in the right direction to increase their quality of life. Therefore, this paper aims to allow for a better understanding of COVID-19 and its impact on the physical activity behavior of college students while navigating the unprecedented once-in-a-century acute respiratory disease (COVID-19).

5. Conclusion

The findings provide important insights into the best practices for dealing with COVID-19 while understanding the adverse effects college students experience, such as increased stress levels, academic workload, psychological separation, fear of contracting COVID-19, reduced physical and mental health, and limited physical behavior of college students. In addition, students have experienced perceived stress, which is a key mechanism in their mental health and wellness.

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