

Campus Recreation and Fitness Center Utilization During the COVID-19 Pandemic

Keagan Kiely, MS, CSCS¹, William A. Mase, Dr.PH², Bridget Melton, Ed.D³, and Haresh Rochani, Dr.PH⁴

¹Campus Recreation and Intramurals, Georgia Southern University; ²Jiann-Ping Hsu College of Public Health, Department of Health Policy and Community Health, Georgia Southern University; ³Waters College of Health Professions, Department of Health Sciences and Kinesiology, Georgia Southern University; and ⁴Jiann-Ping Hsu College of Public Health, Department of Biostatistics, Epidemiology and Environmental Health, Georgia Southern University

Corresponding Author: Keagan Kiely • Fitness Program Director, Campus Recreation and Intramurals, Georgia Southern University - Statesboro Campus • P.O. Box 8078, Statesboro, Georgia 30460 • Telephone: (912) 478-7231 • Email: kkiely@georgiasouthern.edu

ABSTRACT

Background: The impact of the COVID-19 pandemic has far reaching effects for college students' health and physical activity behaviors. This analysis focuses on university student fitness center usage pre and during the COVID-19 pandemic. Researchers hypothesized a reduction in fitness center utilization when comparing Fall 2019 to Fall 2020 utilization rates.

Methods: Patterns of the recreation center and fitness center utilization during the COVID-19 pandemic are compared to pre-pandemic patterns of a matched time period in the previous academic year in an observational study. Overall utilization was evaluated using secondary data from the university's recreation center data system. Six weeks of utilization data were pulled for investigation across the two years of interest. Time periods evaluated included Fall semester 2019 (August 19, 2019 - September 29, 2019) and Fall semester 2020 (August 17, 2020 - September 27, 2020). Poisson regression analysis was used where statistical significance levels were set to 0.05.

Results: There was a statistically significant reduction in recreation center participation from 2019 to 2020 (Mean±SD: 1683.1 ± 888.6 to 726.4 ± 339.9). Furthermore, student participation decreased in all areas of the fitness center usage from 2019 to 2020 (cardio deck, machine weights, and free weights Mean±SD: 12.5±8.9 to 5.4±4.2, 17.6±9.5 to 8.9±5.4, 27.7±13.1 to 17.9±8.4). While the overall participation decreased, the proportion of utilization increased in the free weights area (B = 0.2446; 95% CI 0.1604 – 0.3289; p<0.001) during the year 2020 when compared to 2019.

Conclusions: This study is one of the first to evaluate the effect the COVID-19 pandemic has on participation in a university recreation center. This study will help generate questions and guide future research analyzing trends of physical activity during the COVID-19 pandemic.

Keywords: COVID-19, student, health, fitness, campus wellness.

INTRODUCTION

The novel Coronavirus disease of 2019 (COVID-19) caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has overwhelmed the nation, with the White House officially declaring a national emergency on March 13, 2020. The COVID-19 pandemic has caused many of us to struggle to find a 'new normal' while simultaneously overcoming the barriers presented by this pandemic. Investigation is needed to fully understand the complex and changing dynamics that the COVID-19 pandemic has introduced to those within a university setting.

Entering a university coincides with a natural decrease in exercise and an increase in perceived barriers to participating in exercise (Gyurcsik et al., 2004, 2006, Trost et al., 2002). Although physical activity is emphasized throughout childhood with team sports and physical education classes, university students have full autonomy to decide on whether to pursue physical activities or not. It is believed that late adolescence to young adulthood is the

period in which physical activity levels decline (US Department of Health and Human Services, 2000). Under 'normal' circumstances, 50% of individuals starting an exercise program discontinue it within six months (Fallon et al., 2005). With new barriers unique to the pandemic, including mandated fitness center closures, mask mandates in fitness centers, social distancing, and an overarching uncertainty of the detrimental effects of a novel disease, one would hypothesize this number to be even larger in individuals entering a university during a pandemic.

Any decline in physical activity has a deleterious effect on overall health, ultimately, leading to increased mortality and morbidity rates (CDC, 2008). A study of 16,936 college graduates showed decreased rates of mortality of 49% in participants who maintained regular physical activity from university years through their 70s compared to their less active counterparts (Paffenbarger et al., 1986). This study underlines the necessity for institutions of higher education

to create and provide an environment and resources conducive to an active lifestyle. High school students involved in vigorous physical activity drop from 54.9% to 37.6% moving from high school to college and approximately 30% of individuals become inactive in the transition to university life (Gyurcsik et al., 2004). The highest rate of decline in physical activity has been shown to occur between the ages of 15 to 25 years (Gyurcsik et al., 2006). Therefore, the implementation and maintenance of physical activity during the years at a university are integral to the health and wellness of individuals, ultimately having population-level health implications.

In an effort to reopen during the COVID-19 pandemic, many universities welcomed students back on campus with additional precautions and policies in place to protect students (Walke et al., 2020). Although 57% of campus recreation department leaders said their recreational facilities are closed indefinitely (Popke, 2020), other campus recreation departments are advancing efforts to provide physical activity opportunities to students. The university analyzed in this study closed campus recreational centers and suspended fitness programming between March 13, 2020, and August 3, 2020. Over this period of suspended operations, thoughtful and deliberate attention was given to all aspects of fitness center safety including physical repositioning of equipment, patron health screening upon entry, disease transmission preventive measures (e.g. masking), and max-capacity limits set on areas and classes (Georgia Southern University Return to Campus Plan Fall 2020, pp. 49-51). With extraordinary efforts taken to assure the highest attainable level of safety within the recreational and fitness center, researchers sought to quantify their assumptions of the observable decline in fitness center usage by the Fall 2020 returning student population.

How the COVID-19 pandemic and the precautions taken by university recreational activity facilities management affects an individual's exercise behaviors is yet to be determined. Preliminary data has shown that there are significant differences between inactive and active participants. More specifically, a greater portion of inactive participants reporting less physical activity and a greater portion of active participants reporting more physical activity since the onset of the COVID-19 pandemic (Lesser and Nienhuis 2020). Furthermore, another study found young adults had a significant decline in physical activity while an increase in time spent in both sedentary behaviors and sleep was observed (Zheng, 2020). Until it is known if the COVID-19 pandemic affects recreational and fitness center usage and the magnitude of usage decline, any attempt to understand why this occurs may be premature.

The purpose of this study was to conduct an observational study, whereby patterns of the recreation facility and fitness center participation during the current pandemic are compared to pre-pandemic patterns of a matched time period in the previous academic year to assess any participation differences.

METHODS

This observational study used secondary data collected from the recreational center located on a campus of a university with approximately 18,500 students in the southeastern United States. The data analyzed was collected over the initial six weeks of university operations in Fall, 2020 as well as retrospective matched data pulled for the initial six weeks of Fall, 2019. In both designated timeframes, the campus was open to all students and on-campus classes were fully operational in accordance with the Georgia Southern University Return to Campus Plan (Georgia Southern University Return to Campus Plan Fall 2020). Due to the capacity limitations in classrooms, additional sections were offered. It was assumed that this did not affect the total number of students on campus. The data starts at the beginning of the university semester, August 17th, and ends September 27th, 2020. For comparison, the same timeframe was used from the Fall of 2019, starting from August 19th through September 29th, 2019.

There was essentially the same amount of students enrolled in 2019 as there was in 2020, 18,256 and 18,828 respectively (Georgia Southern University's Office of Institutional Research, 2020). Furthermore, the University set the standard for all classes to resume in person with safety precautions implemented. These safety precautions were implemented prior to the start of the academic year. To illustrate the magnitude of positive COVID-19 cases in the University's population, there was an average of 185 cases per week during the studies duration, with the second week of the academic semester (August 24th –August 30th) reaching 508 confirmed and self-reported total COVID-19 cases.

First, researchers examined the total number of participants that entered the recreational center. This was done either through IrisAccess 7000S (Iris ID Systems, Inc. Cedar Brook Corp Center, 8 Clarke Drive, Cranbury, NJ 08512), School ID scanner, or manual entry from university employees. All check-ins are collected and stored on RecTrac software (Vermont Systems, Inc. 12 Market Place Essex Junction, VT 05452). This number consisted of students participating in the recreation center for class, exercise, or extracurricular activities.

Second, the researchers examined student participation in the fitness center. The fitness center data was chosen for two reasons. First, fitness center staff take participation counts every hour of operation, giving researchers abundant data with which to work with. Secondly, this participation in the fitness center is of immense importance due to the aforementioned morbidity and mortality implications of decreased physical activity. The fitness center is further broken down into three unique areas: free weights, machine weights, and cardio deck. The individual participation for each area is taken by observational counts from a student employee every hour by the employee physically surveying each part of the fitness center and counting patrons. These counts start at open (6:00 am) and continue every hour until close (10:00 pm). Unique participation is not corrected from hour to hour. For example, a student that was working out

from 7:45-9:15 am would be counted during the 8:00 am and 9:00 am fitness center data count. Thus, the researchers chose to examine the times of statistical collection at 7:00 am, 12:00 pm, 4:00 pm, and 7:00 pm. This was done in the hopes that no patron was counted twice.

This research was approved by the university Institutional Review Board (IRB) as exempt 4 secondary data research (H21131).

Statistical Methods

Once the data set was cleaned, statistical analysis was conducted using SAS (version 9.4; SAS Institute, Cary, NC, USA). The type of fitness center and year of data collection were the two independent variables for our analysis. Student participation in the fitness center and the total number of

participants that entered the recreational center were our two dependent variables. For all dependent and independent variables, means and standard deviations were estimated by year. For both dependent variables of student participation in the fitness center and the total number of participants that entered the recreational center, Poisson regression models were used. Statistical significance levels were set at 0.05.

RESULTS

Table 1 demonstrates the descriptive characteristics of the total number of participants that entered the recreational center and participation in the fitness center by year. Mean and standard deviations for the total number of participants that entered the recreational center are reported in Table 1. In addition, the mean and standard deviations of participation in fitness centers by each center and year.

Table 1
Descriptive data by year

	Year 2019	Year 2020	Total
Total number of participants that entered recreation center per day			
Mean +/-S.D	1683.1 ± 888.6	726.4 ± 339.9	1180.9 ± 813.0
Participation in the fitness center by the hour			
Fitness Center			
Cardio Deck	12.5±8.9	5.4±4.2	8.7±7.7
Machine Weight	17.6±9.5	8.9±5.4	13.0±8.8
Free Weight	27.7±13.1	17.9±8.4	22.5±11.9

SD – standard deviation

Table 2
Estimates of effects year on the total number of participants that entered the recreation center

Parameter	β	SE	95% CI	p
Intercept	7.4284	0.004	(7.4207, 7.4362)	<0.001
Year	-0.8403	0.007	(-0.8539, -0.8266)	<0.001

Reference category is Year 2019

We modeled the relationship between the total number of participants that entered the recreational center and year. Table 2 shows the results from that Poisson regression model. Overall, the total number of students entering the recreational center were significantly lower (B = -0.8403; 95% CI -0.8539 - -0.8266; p < 0.001) compared to year 2019.

We also modeled the relationship between student participation in fitness center areas and year. Table 3 shows the results from that Poisson regression model. After controlling for fitness center variables, overall, participation

in the cardio deck was lower (B = -0.3458; 95% CI -0.4089 - -0.2827; p < 0.001) compared to the machine weight center. Furthermore, student participation in cardio deck for year 2020 was lower (B = -0.1622; 95% CI -0.2709 - -0.0536; p = 0.0034) compared to student participation in cardio deck for year 2019. However, the student participation in free weight for year 2020 was significantly higher (B = 0.2446; 95% CI 0.1604 – 0.3289; p < 0.001) compared to student participation in free weight for year 2019.

Table 3

Estimates of the effects of predictor variables on student participation in fitness centers

Parameter		β	SE	95% CI	<i>p</i>
Intercept		2.8691	0.0207	(2.8285, 2.9097)	<0.001
Fitness Center					
Cardio Deck		-0.3458	0.0322	(-0.4089, -0.2827)	<0.001
Free Weights		0.4519	0.0265	(0.4000, 0.5039)	<0.001
Year		-0.6833	0.0346	(-0.7510, -0.6155)	<0.001
Interactions					
Cardio deck	Year 2020	-0.1622	0.0554	(-0.2709, -0.0536)	0.0034
Cardio deck	Year 2019	0	0	.	.
Free Weight	Year 2020	0.2446	0.043	(0.1604, 0.3289)	<0.001
Free Weight	Year 2019	0	0	.	.

Reference category is machine weight

DISCUSSION

The COVID-19 pandemic has reached all corners of an individual's life, presenting barriers in almost all daily activities. The current study investigated the effects of the COVID-19 pandemic on college student physical activity behaviors, specifically the usage of an on-campus recreational center and fitness patterns. Overall, there was a significant decline in the usage of the campus recreational center. Upon further investigation, fitness usage within the recreational center was not only significantly lower, but there was also a significant difference in the fitness areas utilized within the fitness center, with more participants selecting to use free weights during the COVID-19 pandemic as compared to the other two fitness area options (cardio deck and machine weights).

The total recreation usage dropped from an average of 1,683 (SD = 888) participants per day in 2019 to 726 (SD = 339) in 2020. In light of the COVID-19 pandemic, the expectation that fewer students, faculty, and staff would engage in indoor recreational and fitness activities is reflected in the current data. The smaller standard deviation in Fall 2020 may signify that those who are participating in the fitness center may be individuals who are more consistent with their exercise regime. Essentially, there is less difference within average uses of the recreation center because, one would deduce, the same group of individuals are using it. This may demonstrate that the barriers presented from the COVID-19 pandemic may disproportionately affect individuals who do not consistently participate in recreational activity or fitness center usage. Further elucidating the immense impact of the COVID-19 pandemic has on the adoption of pro-health

behaviors and physical activity of individuals. Personal beliefs on how to manage one's own safety during a pandemic can set internal restrictions on what an individual is willing to do. For example, out of a cohort of over 4,000 people nearly 78% of them reported self-isolation, over 85% avoided groups larger than 10, and almost 80% always or often kept 6ft or greater distance from others (Czeisler et al. 2020). Intrinsically set parameters like these make exercising in fitness facilities highly challenging.

After investigating the total usage data, the researchers were able to explore the patterns of usage within the fitness center specifically. It was noted that all areas including free weights (27.7±13 to 17.9±8.4), machine weights (17.6±9.5 to 8.9±5.4), and cardio deck (12.5±8.9 to 5.4±4.2) had significant reductions in users per hour from 2019 to 2020. Interestingly, the proportion of users changed between these three areas, with more users participating in free weights compared to the cardio deck and machine weight area. Several factors might explain this trend. First, exercise during this pandemic has been encouraged to be outside and independent, which may have influenced the individual choice to use cardiovascular equipment (Woods, 2020). Second, the proportion of free weight area usage might have increased due to the fact that other weight training facilities were closed or unavailable. Smaller facilities or add-on gyms, such as apartment complexes, may have chosen not to reopen their fitness areas due to the increase in cleaning and social distancing protocols that are not feasible or enforceable. This trend might have had an influence on the choice of exercise among students. Another issue that might have increased the free weight area usage or decreased the cardio deck and machine area is the increase in perceived exertion caused by wearing a mask while

performing different types of exercise (Motoyama et al. 2016). For example, an anaerobic modality that has intermittent times of rest, such as your typically prescribed resistance training protocols, may be more manageable than a long duration aerobic exercise, such as a treadmill run. Wearing a mask during exercise can increase your heart rate compared to the same intensity without a mask, further many individuals find masks during exercise to be unpleasant (Reynolds, 2020). With the sensation of increased exertion, individuals may have preferred modes of exercise that allow adequate downtime to recover.

Limitations

This study does not come without its unique set of limitations. With the data being strictly quantitative, reasons for decreased participation can only be drawn from speculations based upon data patterns. The ecological fallacy must be avoided with the understanding that the present data for decreased participation does not elucidate the reasons for decreased participation on an individual level. Individuals' reasons could range from not wanting to comply with the university's mask mandate to not returning to campus for health concerns or anything in between.

Another factor influencing the total decrease in recreational center numbers could be related to reduced academic physical activity classes offered in the recreational center. In Fall 2019, a total of 1,528 seats in various physical activities were provided, this was reduced to 582 seats in Fall 2020. In order to meet the COVID-19 pandemic space capacity and social distancing recommendations by the health department and Centers for Disease Control and Prevention (CDC, 2020), classes were reduced and some eliminated. Class sizes were reduced in some cases by 50% to facilitate social distancing. The impact of these changes unquestionably reduced the daily census of overall entries in 2020. However, since these classes do not occur in the fitness center, it would have no effect on the fitness center participation counts used in these analyses. To further complicate the issue, attendance in academic physical activity classes was lower with an average of only 70% in attendance on most days. Many students were required to isolate or quarantine due to contact tracing on campus, some students expressed fears of attending in-person classes due to their personal situations, and others did not want to comply with the face covering policy within the recreation center. In a poll of Americans at the end of summer revealed 20% of adults said they feel comfortable returning to a gym setting, and 25% said they plan to never go back to a gym (Ducharme, 2020). Furthermore, survey data gathered on exercise during lockdown showed that there was decreased motivation to participate in exercise (Steele et al. 2020). Decreased exercise behavior during periods of lockdown may have a residual effect on motivation to exercise as areas and businesses reopen.

The data from the fitness center was observational data from the university student staff. The accuracy of the participation count may have become less reliable as the fitness center increased in patrons. For example, increased

student volume within the fitness center might result in errors in count data by student staff. Furthermore, although improbable, if a patron was in the fitness center for an excessive amount of time, they may have been counted more than one time.

Not all data matched appropriately for analysis. During the week of September 2nd, 2019, the university's campus was closed due to inclement weather for a total of four and a half days. Other data was missing for analysis due to incomplete data collection from student staff. The rare occurrences that the employees were unable to record participation would have negligible implications on the results.

One potential source of error is that researchers did not differentiate the entries and fitness center participation between students and the university's faculty/staff and would not represent student participation by definition. The recreation center's database showed that only about 3% of overall recreation center users are faculty or staff of the university and do not represent student participation by definition. These numbers are not excluded from the analysis and represent a potential source of error.

Public Health Implications

The COVID-19 global pandemic has dramatically altered residence life, classroom experiences, and health and fitness services in virtually every college student's life. The core mission of public health is to promote and protect the health of populations. The COVID-19 pandemic has placed university leadership in a difficult position whereby they are called to take action to protect students from communicable diseases while at the same time promote fitness and recreational activities which might place students at increased risk of infectious disease transmission. The college years are a pivotal window of opportunity for students to engage in and establish their future patterns of pro-health and fitness engagement. This analysis demonstrates a fairly dramatic and statistically significant reduction in a number of metrics used to evaluate health and fitness participation among university students. Ultimately these data present a snapshot of changed pro-health patterns, leaving more unanswered questions as to the short-term and long-term impacts and effects.

CONCLUSIONS

This study is one of the first to evaluate the effects of the COVID-19 pandemic on participation in a university recreational fitness center. Due to this, there is not a body of literature to compare findings. Although it is evident that the barriers presented by the COVID-19 pandemic have played a major role in the behavior changes of individuals in the past seven months, this study highlights the changes associated with physical activity and health improvement. This study will help generate questions and guide future research analyzing trends of physical activity during the COVID-19 pandemic.

Acknowledgements

The authors wish to extend our gratitude to the directors of the university recreational center for providing the data which was analyzed in this study. Also, our appreciation for the student and staff personnel of the recreational activity center who carry-out their important work by providing a safe, sanitary, and hygienic environment for the student population they serve. Our appreciation to the university administration, including the Office of Research Integrity - Institutional Review Board, for providing vital institutional support services that have made operating optimally in suboptimal conditions possible. Finally, and most importantly our appreciation to our student population who have endeavored and adapted in the COVID-19 times, making the best out of less than ideal circumstances.

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