

The Effects of COVID-19 on Physical Activity Levels in Shippensburg University Students

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ABSTRACT

The COVID-19 pandemic has created changes in most aspects of everyday life including modes of physical activity. Although the pandemic occurred recently, there have already been studies examining physical activity levels and other factors that may have changed due to COVID-19. However, we have not found a study that looked specifically at college students and how the pandemic has impacted their daily living and physical activity. The purpose of this study was to determine if there was a significant decline in physical activity levels due to the COVID-19 pandemic within the college student population. Sixty-five college students (M age = 20.70 ± 1.09 years) completed a survey sent to their university email accounts, which consisted of questions tailored to examine pre- and post-COVID-19 physical activity levels. The survey also included several open-ended questions about personal impacts and barriers when it comes to exercising in the midst of a pandemic. Multiple dependent t-tests were conducted to analyze the data. The number of hours per week of recreational sport and fitness activity declined significantly by approximately 55% (6.38 to 2.88 h/week, $P < .001$) but there was not a significant decline in other daily physical activity ($P = .117$). Correspondingly, there were significant increases in sedentary behavior, such as a 25% increase in sitting time (from 5.86 to 7.35 h/day, $P < .001$) and a 58% increase in screen time (from 5.23 to 8.29 h/day, $P < .001$). The number of students with physically active jobs also decreased. Overall, it was determined that physical activity levels in college students have been negatively impacted by the pandemic.

Keywords: pandemic; exercise; lockdown; lifestyle; sedentary behavior

INTRODUCTION

Physical activity has been known to be a key factor in maintaining a healthy lifestyle physically, mentally, and emotionally (Qin et al. 2020). However, the importance of physical activity became even more prevalent in the age of a pandemic such as the coronavirus disease of 2019 (COVID-19). With lockdown regulations being implemented around the world, many feel stuck being indoors with minimal social interactions and an inability to get or stay active, which can be very damaging to mental and physical health. A study researching the impacts of social

isolation on mental health and the likelihood of developing depression found that the inclusion of out-of-home physical activity into daily living can significantly decrease the likelihood of developing depression (Herbolsheimer et al. 2018). A secondary study mentions that aerobic physical activity interventions have been found to be effective with a plethora of anxiety disorders as well as stress-related disorders, such as post-traumatic stress disorder, which are likely to be seen among survivors and front-line health care workers (Herbert et al. 2020). The COVID-19

pandemic has caused an abundance of stress and anxiety for most individuals worldwide as there is a sense of uncertainty and fear related to outcomes of the pandemic. Duncan et al. (2020) even notes that a decrease in perceived amounts of physical activity can be linked to higher levels of stress and anxiety in individuals.

According to Hudson and Sprow (2020), physical activity has been shown to boost the immune system by increasing macrophage activation. Macrophages are effector cells of the immune system that phagocytose bacteria and secrete both proinflammatory and antimicrobial mediators. In addition, macrophages play an important role in eliminating diseased and damaged cells through their programmed cell death. Therefore, physical inactivity can lead to increased risk of chronic and acute diseases, making one even more vulnerable to contracting COVID-19 during the pandemic.

Another factor that is affecting individuals' health is an increase in energy intake due to the isolation measures. Gallo et al. (2020) found that with an increase in time spent at home, energy consumption had risen while physical activity levels stayed the same. This could lead to negative effects such as weight gain and it was theorized that prolonged isolation measures could have long term negative effects on dieting and exercise in college students. This may be due to an increase in the amount of snacking, along with an increase in perceived "stress-eating," specifically among females (Gallo et al. 2020). An additional burden placed on all college students includes the use of virtual classes and forced closures of community areas causing physical activity levels to drop. This could be predicted as students were no longer walking to class or on campus, along with not visiting friends or attending social gatherings in the area. The increase in food or caloric intake combined with the decrease in physical activity due to forced

isolation measures would, over an extended period of time, lead to weight gain.

An additional instance seemingly impacting physical activity levels during the pandemic is the setting in which you live. According to Zenic et al. (2020) there appears to be a greater impact on those in urban settings as restrictions tend to be greater due to more dense populations posing greater risks of widespread infection. However, in rural settings, the initial baseline for physical activity levels was lower than those in an urban setting, which means that there would be a smaller effect of restrictions on activity.

The relationship between COVID-19 and participation in sports and exercise has already been addressed in previous research, however, few studies have looked at changes in sport participation during stay-at-home orders resulting from a pandemic. Schnitzer et al. (2020) examined differences in frequencies and types of behaviors in sports before, during, and after coronavirus stay-at-home orders in Austria. The researchers found that the people of Tyrol, Austria participated in less sports during the COVID-19 outbreak than before or after. However, 45% of those who participated in less sports prior to the pandemic reported having increased their overall levels of physical activity after the stay-at-home order ended. In addition, a number of respondents reported an increase in home-based training (fitness exercises 11%, aerobic/gymnastics 11%, and other forms of home workouts 6%). Outdoor sports such as hiking, biking, walking, and jogging also increased during the stay-at-home order.

The literature that was reviewed had substantial findings comparing physical activity changes throughout the pandemic and why it is significant to study. However, fewer studies focused specifically on college-aged students. For college students, it is incredibly important to maintain physical health and well-being through exercise, especially in a period where

screen time is significantly increased through the use of online classes and meetings.

In order to better understand physical activity trends among college students, a survey was created to distribute to Shippensburg University students in order to analyze the changes in their physical activity levels due to the pandemic. The purpose of this investigation was to gain an understanding of how the COVID-19 pandemic affected activity levels in college-aged adults. It was hypothesized that pre-pandemic physical activity levels would be higher than during-pandemic physical activity levels due to a multitude of factors, some of which include the shutdown and closure of gyms and public spaces, at risk populations being forced to avoid crowds and large gatherings, and forced mandates set by local governments controlling the amount of individuals allowed to congregate at any set location. This survey research will contribute towards understanding how worldwide issues, specifically a global pandemic, can impact a particular population's physical activity adherence and risk factors related to a sedentary lifestyle.

METHODS

The sample that was investigated consisted of 65 college students (32 females, 13 males, 1 genderfluid, 19 unreported) with an average age of 20.70 ± 1.09 years of age attending Shippensburg University. Only six participants (9.4%) were varsity student-athletes. Non-probability sampling was used to recruit participants during the Fall 2020 semester, namely, convenience sampling and snowball sampling. Surveys were sent to students' university email accounts, verifying that they were current students. Of those who responded, 22% were sophomores, 27% were juniors, and 51% were seniors. This study design was

approved by Shippensburg University's Institutional Review Board and all participants voluntarily completed an informed consent form prior to answering any survey questions.

Measures

Participants completed a 35-question survey which assessed their physical activity and the ways in which the COVID-19 pandemic impacted their activity level. Survey questions consisted of scale-based, multiple choice, and open-ended questions. Select items from the Global Physical Activity Questionnaire (Armstrong and Bull 2006) were used to create many of the questions assessing physical activity levels. Specifically, to allow for a comparison, participants were asked to report what their typical activity patterns were like one year ago, and then asked the same set of questions to gauge their current levels of activity. Another question asked how physically active their work was, as well as asking if they spent any leisure time being physically active. Participants were also asked questions about how their lifestyle changed, which included how they felt about their levels of anxiety, stress, physical activity, screen time, and food consumption. Open-ended questions asked participants how they believed the pandemic impacted themselves, their physical activity before and during the pandemic, and what barriers they faced to being active during the pandemic. Participants were also asked to complete a series of demographic questions.

Data Analysis

The survey was created with Qualtrics, an online survey tool, and then shared with potential participants via their university email address. Upon completion of the study, response data from Qualtrics was downloaded and analyzed using the Statistical Package for the Social Sciences (SPSS). A series of dependent t-tests were run to compare before and during pandemic

levels of recreational sport hours, leisure physical activity, sitting time, and screen time. Frequency analyses were conducted to determine levels of physical activity, stress and anxiety, screen time, and food intake. Responses to open-ended questions were reviewed to determine what rationale participants had for their quantitative responses.

RESULTS

Dependent t-tests were conducted to compare before and during pandemic levels of several activity-related variables. Results are presented as mean \pm standard deviation. The results of the dependent t-test analyzing the amount of recreational fitness and sport h/week (Figure 1), pre-pandemic totals (6.38 ± 6.72) were significantly higher than during the pandemic (2.88 ± 4.25), $t(47) = 3.99$, $P < .001$, indicating a decline in this type of activity.

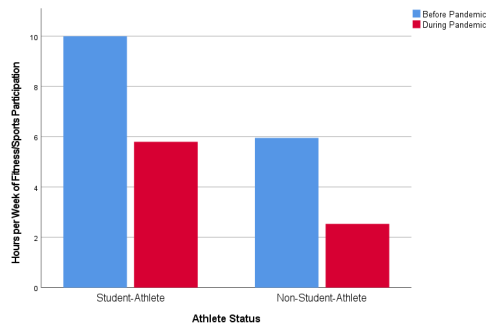


Figure 1. Mean recreational sport and fitness hours per week prior to pandemic vs. during pandemic, grouped by varsity athlete status

Occupational physical activity was also affected. The number of students who reported having a physically active job declined from 35 students (53.8%) to 19 students (29.2%). For those students who maintained a physically active job, the average number of h/day at work being active declined, but not significantly, from before the pandemic (2.34 ± 2.21) to during the pandemic (1.78 ± 3.06), $t(48) = 1.05$, $P = .301$. Other forms of daily activity did not

show a significant decrease in h/day from before (2.08 ± 2.09) to during the pandemic (1.70 ± 1.59), $t(49) = 1.59$, $P = .117$.

There was a significant increase in h/day of sitting time (Figure 2) during the pandemic (7.35 ± 4.76) compared to before (5.86 ± 3.69), $t(49) = 4.18$, $P < .001$. For h/day of screen time specifically (Figure 3), pre-pandemic levels were significantly lower (5.23 ± 2.35) compared to during the pandemic (8.29 ± 2.91), $t(62) = 8.01$, $P < .001$.

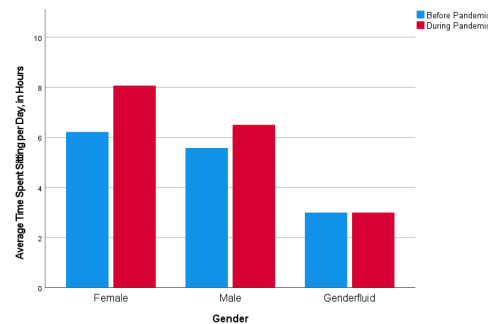


Figure 2: Sitting time prior vs. during the pandemic, grouped by gender

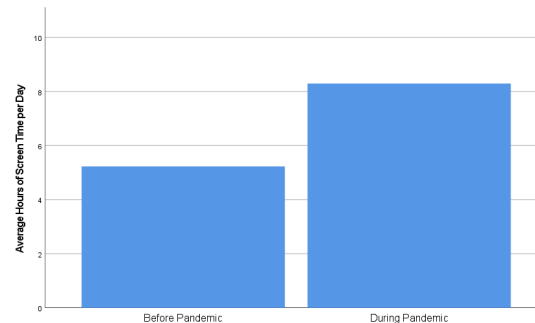


Figure 3: Total screen time prior to pandemic vs. during pandemic

Frequency analyses were conducted to look at how participants believed their lifestyle changed during the pandemic (refer to Table 1). Over 63% of participants said that their physical activity decreased at least somewhat while approximately 95% of participants said their screen time increased. Over 92% of participants shared that their stress levels had increased while over 85% also said anxiety levels increased. Slightly more than half of

participants (53.9%) claimed their overall food intake increased.

Table 1: Percent changes of different lifestyle factors during the pandemic

	Increased a lot	Increased somewhat	No change	Decreased somewhat	Decreased a lot
Physical activity	3.2	11.1	22.2	41.3	22.2
Stress	30.2	61.9	6.3	1.6	0
Anxiety	44.4	41.3	11.1	1.6	1.6
Screen time	49.2	46.0	1.6	3.2	0
Food intake	6.3	47.6	31.7	14.3	0

Open-Ended Responses

The first open-ended question asked whether students believed the pandemic significantly impacted them. A majority of the students responded “yes,” with some of the most common reasons for feeling this way being a fear of contracting the virus, a loss of motivation to go out, and a lack of trust in peers to remain safe and healthy while out in public. A smaller number of students answered that they did not believe the pandemic personally impacted them and common responses related to that were an overall lack of fear, lack of going out in public, and explaining that some of them began a physical activity routine during the pandemic.

The second open-ended question inquired about the way in which the COVID-19 pandemic has shaped physical activity to date. Most of the responses explained that physical activity levels decreased due to the pandemic and noted that this was due to a lack of motivation and fear of contracting the virus while others explained that a physical activity routine was picked up out of sheer boredom with stay-at-home orders.

The third open-ended question asked about physical activity levels prior to COVID-19 to which there was a wide variety of responses. Of those who claimed their physical activity levels were higher prior to COVID-19, it was mostly attributed to a job in which they were active or having to walk around the campus community, and limited access to facilities/sports as well as anxiety over contraction of the disease. There were a few students who responded that they were less fit prior to the pandemic, and finally of those who claimed their physical activity levels stayed the same it was due to upkeep of a normal routine.

The fourth open-ended question asked about barriers to physical activity during the COVID-19 pandemic. The most common responses among students was a sense of fear and anxiety surrounding the unknowns of the pandemic. The second most common response related to an overall lack of motivation and sense of laziness caused by the pandemic. Other common responses were related to school course workload increasing with online

courses and a distaste for wearing a mask in physical fitness centers.

DISCUSSION

We hypothesized that physical activity levels would be higher prior to the pandemic than during the pandemic. While our sample of college students reported a significant decrease in recreational sport and fitness activities from before to during the pandemic, other forms of leisure-time physical activity declined, but not significantly. Overall, these findings provide partial support for our hypothesis. Based on reported data, this was a highly active sample, so it is unsurprising that large declines in recreational activity occurred once preventive restrictions were put in place, including on gyms and sports facilities. That other forms of daily physical activity, like walking, did not decline significantly suggests that this sample was still able to engage in some activity, but not to the degree or intensity as before.

Participants also reported a significant increase in sedentary behaviors such as sitting time and screen time from before to during the pandemic. Many students were completing most of their coursework remotely, if not all of it, which necessitated being on a computer, tablet, or phone to access, which explains the increase in screen time. Students may have also spent more screen time on entertainment due to being asked to stay at home unless necessary. For example, Moore et al. (2020) examined Canadian youths and changes in physical activity during the pandemic. The study ultimately found that the COVID-19 outbreak had an adverse impact on movement and play behaviors in these Canadian youth. Only 2.6% of all children in the study met the 24-h movement behavior guidelines (physical activity, sedentary behavior, and sleep recommendations). Additionally, the researchers found in open-ended responses that families turned to more sedentary-

based leisure activities like arts and craft, puzzles and games, and video games to keep their children entertained, rather than physical activity - which can also be seen as an entertainment solution for college-aged individuals. Taken together, the results show that when opportunities for recreational activity are restricted, that active time will be replaced by sedentary time.

Qualitatively, large majorities of participants agreed that their physical activity decreased and screen time increased, while at the same time stress levels and anxiety significantly increased. Approximately half of participants stated that their overall food intake increased. Haddad et al. (2020) also observed numerous stressors surrounding fear, anxiety, and physical activity, along with greater participation in activities that may negatively impact health, such as screen time and increased food intake. Physical activity is a common form of stress management and provides mental health benefits (Herbert et al. 2020). At a time when college students' mental health was strained, access to spaces for sports and fitness was restricted, which may explain why large majorities reported feeling more stressed and anxious.

The COVID-19 pandemic has been nothing short of unpredictable. While individuals across the world adapt and try to make sense of what is currently occurring, it is easy to let personal care fall by the wayside. This research survey can be added to the literature showing that pandemic-related concerns can contribute to negative health-related outcomes and an overall lack of physical activity. One major limitation of this study is that it relies on self-reported data, which is subject to recollection errors or dishonesty. Personal unconscious bias can skew the way in which participants respond to multiple choice and open response questions, leading them to enhance their performance when in reality it may not be as consistent.

Further research would benefit from analyzing specific changes in physical fitness, such as body composition, strength, or cardiorespiratory endurance from prior to the pandemic versus during to have more concrete evidence of health-related changes instead of relying on self-report data. Additional research could also investigate the use of physical activity as a means of coping with mental stress and anxiety related to the pandemic, along with how to safely conduct and promote activity. A final area of future interest would be to examine in more detail those participants who increased their activity levels during the pandemic to identify what they did successfully while other struggled to stay active.

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