Impact of COVID-19 on Physical Activity and Health Influences Among College Students

Rachael Larkin

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IMPACT OF COVID-19 ON PHYSICAL ACTIVITY AND HEALTH INFLUENCES AMONG COLLEGE STUDENTS

By

Rachael Larkin

A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of the requirements of the Sally McDonnell Barksdale Honors College.

Oxford, MS
May 2021

Approved By

______________________________
Advisor: Professor Thomas Andre

______________________________
Reader: Prof. Ford-Wade

______________________________
Reader: Prof. Loftin
DEDICATION

This thesis is dedicated to everyone who guided and encouraged me throughout my undergraduate career at the University of Mississippi.

Thank you.
I’d like to thank Dr. Tom Andre for being my thesis advisor and guiding me throughout the unprecedented 2020 COVID-19 season. I appreciate the encouragement and support to adapt and complete my thesis project in a timely manner. I would also like to thank the Sally McDonnell Barksdale Honors College for granting this project the research funds to incentivize participants. Lastly, I would like to acknowledge the Exercise Performance and Nutrition Lab research team, Zachary Bell, and Robert Spitz for assisting me through each obstacle during my thesis journey.
ABSTRACT

RACHAEL LARKIN: Impact of COVID-19 on Physical Activity and Health Influences Among College Students

**Objective:** To assess the associations between physical activity, subjective well-being (SWB), and social media influences before, during, and after the 2020 COVID-19 period among college-aged students. **Participants:** Male and female students from the University of Mississippi who were between the ages of 18-25 volunteered to participate in this study. Out of 10,000 invitation emails distributed, a total of 290 individuals responded and were used for the subsequent analysis. **Results:** Almost half of the respondents (46.1%) noted a decrease in physical activity from before March-May (M-M) 2020 to during M-M 2020. In addition, 41% of the respondents reported an increase in weight during M-M 2020, while 69% of these respondents noted to be engaging in moderate physical activity during this time as well. The majority of the respondents (76.4%) said their social media exposure increased during M-M 2020. Respondents following fitness/health influencers on social media increased by 9.3% from before M-M 2020 to during M-M 2020, and decreased by 10.4% from during M-M 2020 to return-to-campus (time since August 2020). Data also showed that there was an increase (32.7%) in negative body image perceptions from before to during M-M 2020. **Conclusion:** College students appeared to be more avid users of social media for work out videos during M-M 2020, but this did not seem to have a carry-over effect on their mental or emotional health. The decrease in physical activity and increase body weight reported in the study might then be explained as a declination of self-efficacy among individuals. Further research is needed to
identify and confirm the present findings, new modes of communication and encouragement from fitness/health influencers, health practitioners, and university health resources should be discussed to better support the physical and mental wellbeing of college students.
It has always been a passion of mine to explore the ways in which people can achieve a healthy lifestyle through physical activity. I approached this thesis research with the desire to learn more about how exercise, social media, and daily health components play crucial roles in an individual’s longevity and well-being. Furthermore, being a part of the college student cohort, it was particularly intrigued by the similarities and differences across the literature regarding a college student cohort versus the general adult population. Therefore, it has been an exciting and enriching research process that I hope to use towards my future endeavors in the medical community.
# TABLE OF CONTENTS

LIST OF TABLES v

LIST OF ABBREVIATIONS vi

INTRODUCTION 1

CHAPTER I: METHODS 5

CHAPTER II: RESULTS 6

CHAPTER III: DISCUSSION 11

CHAPTER IV: FUTURE APPLICATIONS 19

CONCLUSION 22

BIBLIOGRAPHY 23
**LIST OF TABLES**

<table>
<thead>
<tr>
<th>TABLE</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>TABLE 1</td>
<td>Total and percentage of participants by university level</td>
<td>6</td>
</tr>
<tr>
<td>TABLE 2</td>
<td>Total and percentage of participants by ethnicity</td>
<td>6</td>
</tr>
<tr>
<td>TABLE 3</td>
<td>Total and percentage of participants by Degree Program</td>
<td>7</td>
</tr>
<tr>
<td>FIGURE 1</td>
<td>Exercise Frequency in days per week Pre, During, Return M-M 2020</td>
<td>8</td>
</tr>
<tr>
<td>TABLE 4</td>
<td>Fitness/health influencers, social media, negative body image</td>
<td>9</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>SWB</td>
<td>Subjective wellbeing</td>
<td></td>
</tr>
<tr>
<td>NBI</td>
<td>Negative body image</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>Percent</td>
<td></td>
</tr>
<tr>
<td>M-M 2020</td>
<td>March-May 2020</td>
<td></td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
<td></td>
</tr>
<tr>
<td>SSRI</td>
<td>Selective serotonin reuptake inhibitors</td>
<td></td>
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</table>
Introduction

The benefits of incorporating physical activity as a lifestyle practice have long been supported by scientific literature (Haskell et al., 2009). Such behavior is best predicted to become a longevity practice when established early in life (Hirvensalo & Lintunen, 2011). Research shows that when college students create physical activity routines early in their undergraduate careers, there is a greater probability of maintaining the behavior over time (Sparling & Snow, 2002). The physiological and psychological benefits of physical activity include decreased stress levels or at least buffer the stress response, essentially protecting oneself against the negative effects of stress (Grasdalsmoen et al., 2020). Exercise plays an essential role in maintaining mitochondrial biogenesis and function, and prolonged inactivity has been implied to be integral in developing pathophysiology of both somatic (Duchen & Szabadkai, 2010; Grasdalsmoen et al., 2020) and mental diseases (Bansal & Kuhad, 2016; Grasdalsmoen et al., 2020). Furthermore, physical activity has been found to be linked to the functions of neurotransmitters serotonin, dopamine, and noradrenaline in the brain, suggesting that physical activity can create the same activity as selective serotonin reuptake inhibitors (SSRI) antidepressants (Grasdalsmoen et al., 2020). Further, lifestyle indicators such as overweight/obesity (Grasdalsmoen et al., 2019; Ul-Haq et al., 2013) and alcohol use (Pollard et al., 2020), have been inversely related to both physical activity and mental well-being in young adults 18-35 years old.
Unfortunately, 40% to 50% of college students are physically inactive (Keating et al., 2005). Physical inactivity can be referred to as sedentary behavior, broadly defined as any waking behavior characterized by an energy expenditure of \( \leq 1.5 \) metabolic equivalents while in a sitting, lying or reclining posture, though it can be dependent on subtle processes such as bouts of sedentary behavior and breaks from it (Diamond & Byrd, 2020; Tremblay et al., 2017). Observational studies have also determined the physiological consequences of physical inactivity, including increased risk of obesity, cardiovascular disease, cancer, and type II diabetes (Biswas et al., 2015; Wilmot et al., 2012). Sedentary behavior has also shown to significantly lead to mood disturbance (Endrighi et al., 2016) and increase depressive symptoms in as few as 7 days (Edwards & Loprinzi, 2016). Thus, it is necessary to find ways to encourage more people to become physically active because of the numerous benefits on physical and psychological wellbeing.

On March 11, 2020, the World Health Organization declared COVID-19 a global pandemic (Perz et al., 2020), propelling lockdown and shelter-in-place orders at state, county and local levels throughout the United States. Universities were not excluded from these orders, and their shutdowns forced students to relocate off campus. These unprecedented restrictions and sudden relocations affected U.S. college students in different capacities in regards to health, physical activity, and subjective well-being. Subjective well-being can be defined as a multi-faceted construct composed of affective and cognitive components (Diener et al., 1999). Current literature shows students reporting changes in stress, fear, mood, anxiety, and worry as a result of the 2020 lockdown (Perz et al., 2020; Son et al., 2020; Wang et al., 2020). Further, reduced volumes of physical activity and increased sedentary behaviors were reported as a result of the home-confinement (Bentlage et al., 2020). Bentlage et al.’s systematic review of 31 papers
regarding physical activity during COVID-19 concluded that reduced physical activity levels are of pressing concern during home-isolation in pandemic periods, as they likely lead to a higher morbidity rate and inadequate health and fitness (Bentlage et al., 2020).

For the past decade, the scientific literature has witnessed a steady growth on the research looking to the relationships between online social networks and aspects of well-being, specifically body image and exercise (Robinson et al., 2017). Body image is defined as an individual’s perception of their body appearance, as well as the thoughts and feelings that result from said perception (Cash, 2004; Robinson et al., 2017; Tiggemann, 2004). Self-perception is understood to be measured and observed on a positive and negative spectrum. Research has revealed that individuals who were briefly exposed to fitness Instagram influencers, who regularly post images of athleticism (muscular, toned body physique) and thinness (slim, slender body physique), saw an increase in body dissatisfaction increased (Robinson et al., 2017). Furthermore, these posts did not motivate individuals to engage in exercise in the individuals that viewed them (Robinson et al., 2017). However, despite no significant relationship between fitness/health social media and exercise behavior has been observed, but a significant decrease in dietary fat consumption among participants did occur (Williams et al., 2014). These contradicting results suggest fitspiration influencers continue to post and engage in content that may not have a positive impact on viewers. A study from Casale et al. investigated this social media and body dissatisfaction relationship through multiple exposures to appearance-focused Instagram profiles, and found that between genders, women reported increased body dissatisfaction when viewing Instagram profiles of same-sex individuals, while men did not have an effect on the same exposure. Further, they found the females experience a higher level to
which they define themselves and their self-worth to be predicted on their physical appearance (Casale et al., 2019).

Despite what the literature proposes about physical activity and subjective well-being among young adults, there is limited research on how the 2020 COVID-19 lockdown restrictions affected these relationships, especially among college students. Based on these considerations, the aims of this study are 1) to examine how college students adapted to the 2020 COVID-19 restrictions of the months March-May in regards to their physical activity frequency, mode, motivation, and location 2) to examine participants’ subjective well-being components of body image, weight, alcohol use, and social relationships pre, during, and post seasons of the March-May 2020 period and, 3) to examine social media, specifically fitness/health influencers, play a role in these findings.
Methods

The study used a cross-sectional design to investigate changes in exercise, subjective well-being, and social media behaviors before, during, and after the lockdown months of March-August 2020. The survey invitation was sent to 10,000 student emails from the University of Mississippi Panel Survey Group in November of 2020. The link and QR code to the survey were directly in the launched email. When consented, the participant began the 91-question survey relating to mental, physical, and general health before, during COVID-19 March-May 2020 period, and return-to-campus period since August 2020. The survey took an average of ten minutes to complete, and contained three sections of information, physical activity parameters (frequency, mode, location, motivation, enjoyment, and socializing), social media usage (usage time, exercise-related purpose, attention to fitness/health influencers), and finally components of SWB (alcohol frequency and volume, anxiety, optimism, and relationships). These subsections were all asked under the context of the three specified time periods. Data was collected between the dates November 11th, 2020 to January 30th, 2021. In total, 373 started the survey and a total of 290 individuals completed the entire survey.
**Results**

Table 1, 2, 3, and 4 display the subject characteristics based on classification, demographics, and degree program, respectively. Figure 1 contains the exercise frequency levels (in days) for total individuals across the three time periods before and during March-May 2020 (M-M 2020) and return-to-campus.

<table>
<thead>
<tr>
<th>Classification</th>
<th>n</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>58</td>
<td>20.0%</td>
</tr>
<tr>
<td>Sophomore</td>
<td>48</td>
<td>16.6%</td>
</tr>
<tr>
<td>Junior</td>
<td>64</td>
<td>22.1%</td>
</tr>
<tr>
<td>Senior</td>
<td>85</td>
<td>29.3%</td>
</tr>
<tr>
<td>Graduate</td>
<td>35</td>
<td>12.1%</td>
</tr>
</tbody>
</table>

**Table 1.** Total and percentage of participants by university level (n=290)

<table>
<thead>
<tr>
<th>Demographics</th>
<th>n</th>
<th>Percentage (%)</th>
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<tbody>
<tr>
<td>American Indian or Alaskan Native</td>
<td>1</td>
<td>0.3%</td>
</tr>
<tr>
<td>Asian</td>
<td>8</td>
<td>2.8%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>30</td>
<td>10.3%</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>12</td>
<td>14.5%</td>
</tr>
<tr>
<td>Two or more races</td>
<td>5</td>
<td>1.7%</td>
</tr>
</tbody>
</table>
White  |  234  |  80.7%

**Table 2.** Total and percentage of participants by ethnicity (n=290)

<table>
<thead>
<tr>
<th>Degree Program</th>
<th>n</th>
<th>Percentage (%)</th>
</tr>
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<tbody>
<tr>
<td>College of Liberal Arts</td>
<td>85</td>
<td>29.3%</td>
</tr>
<tr>
<td>General Studies</td>
<td>9</td>
<td>3.1%</td>
</tr>
<tr>
<td>Graduate School</td>
<td>40</td>
<td>13.8%</td>
</tr>
<tr>
<td>School of Accountancy</td>
<td>24</td>
<td>8.3%</td>
</tr>
<tr>
<td>School of Applied Sciences</td>
<td>34</td>
<td>11.7%</td>
</tr>
<tr>
<td>School of Business Administration</td>
<td>35</td>
<td>12.1%</td>
</tr>
<tr>
<td>School of Education</td>
<td>17</td>
<td>5.9%</td>
</tr>
<tr>
<td>School of Engineering</td>
<td>17</td>
<td>5.9%</td>
</tr>
<tr>
<td>School of Journalism and New Media</td>
<td>16</td>
<td>5.5%</td>
</tr>
<tr>
<td>School of Pharmacy</td>
<td>13</td>
<td>4.5%</td>
</tr>
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</table>

**Table 3.** Total and percentage of participants by Degree Program (n=290)
Almost half of the respondents (46.1%) noted a decrease in physical activity from before M-M 2020 to during M-M 2020. During this transition period, 24% reported an increase in exercise frequency, and 29.9% reported a maintenance of frequency since before March 2020. Among the reports of during M-M 2020 to return-to-campus periods, 24% said to have increased their exercise frequency, while 32% decreased and 44% held maintenance since their M-M 2020 exercise frequency. Forty-one percent of the respondents noticed an increase in weight during M-M 2020, while 69% of these respondents noted to be engaging in moderate physical activity during this time. Thirty-one percent of individuals who reported increase in weight also either decreased their exercise frequency or were not exercising at all. When observing the increase in weight with university classifications, 20.0% of freshmen, 16.6% of sophomores, 22.1% juniors, 15.5% seniors, 22.9% were males, and 24.7% were females.
29.3% seniors, and 12.1% of graduate students reported this trend. Majority of the respondents (76.4%) said their social media exposure increased during M-M 2020.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>Somewhat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before M-M 2020 fitness/health influencer role in life</td>
<td>61</td>
<td>229</td>
<td>0</td>
</tr>
<tr>
<td>During M-M 2020 fitness/health influencer role in life</td>
<td>58</td>
<td>202</td>
<td>30</td>
</tr>
<tr>
<td>Return to Campus fitness/health influencer role in life</td>
<td>36</td>
<td>237</td>
<td>17</td>
</tr>
<tr>
<td>Before M-M 2020 following fitness/health influencers on social media</td>
<td>85</td>
<td>205</td>
<td>N/A</td>
</tr>
<tr>
<td>During M-M 2020 following fitness/health influencers on social media</td>
<td>121</td>
<td>169</td>
<td>N/A</td>
</tr>
<tr>
<td>Return to Campus following fitness/health influencers on social media</td>
<td>78</td>
<td>212</td>
<td>N/A</td>
</tr>
<tr>
<td>Before M-M 2020 Negative Body Image</td>
<td>92</td>
<td>88</td>
<td>110</td>
</tr>
<tr>
<td>During M-M 2020 Negative Body Image</td>
<td>170</td>
<td>71</td>
<td>49</td>
</tr>
</tbody>
</table>

Table 4. Fitness/health influencers, social media, negative body image (n=290)

As shown in Table 4, respondents following fitness/health influencers on social media increased 9.3% from before M-M 2020 to during M-M 2020, and decreased 10.4% from during
M-M 2020 to return-to-campus (time since August 2020). Data showed that there was an increase (32.7%) in negative body image perceptions from before to during M-M 2020, making the total of participants who experienced negative body image during M-M 2020 to 74.7%.
Discussion

The present study found that 29.9% of the participants reported no change in their exercise frequency, while 46.1% reported a decrease, and 24% reported an increase in their exercise frequency during the 2020 COVID-19 pandemic restriction months of March-May (M-M 2020). Comparative analysis of the results to an international study by Brand et al (2020), observed 44.2% of the participants reported no change, 23.7% reported a decrease, and 31.9% reported an increase in exercise frequency during the same time period (Brand et al., 2020). The previously mentioned study’s model of exercise behavior changes during lockdown determined that lockdown restrictions (closing of gyms, recreational facilities, fitness businesses, etc.) did not decrease exercise frequencies for those who are deemed regular exercisers, defined as individuals who engage in moderate-intensity exercise at least 150 min per week (ACSM Issues New Guidelines on Quantity and Quality of Exercise, n.d.), and even lead to adoption of exercise for those that are inactive prior to the lockdown (Brand et al., 2020). Interestingly, among the respondents from the current investigation that did have access to a gym facility during M-M 2020 (26.7%), majority did not attend frequently (22.2%). A possible explanation is the psychological concept of self-efficacy theory (Bandura, 1989), which is described as an individual’s belief that he/she is capable of performing a behavior with success or achieving a set goal. If individuals did not have goals of physical activity or fitness as the transition to the M-M 2020 lifestyle occurred, the individuals were significantly less likely to engage in physical activity. Yeo (2020) mentioned that the overarching need to reduce disease transmission had a tremendous impact on sports and exercise (Yeo, 2020). Furthermore, geographic-dependent
restrictions on outdoor exercise such as climate and availability and the stress to stay home have led to reduced physical activity and increased sedentary behavior (Yeo, 2020).

In regards to a decrease in exercise frequency, potentially the increase in sedentary behavior suppresses exercise motivation and self-efficacy to be physically active. This increase in sedentary behavior is likely due to the new reliance on telework, homeschooling, and online socializing (Colley et al., 2020). Despite the repositioning to the home-based methods for school and/or work, M-M 2020 also increased social media exposure. Wang et al. noted that among the main sources of information regarding the pandemic for their college student participants (university emails, newspapers, paper and online periodicals), 50.5% came from posts on social media (Wang et al., 2020). The present study observed a large increase in social media usage during periods of quarantine (76.4%), which is similar to Colley et al.’s findings of a 75.8% increase among men, and a 74.8% increase among women within the 20-34 years old age cohort (Colley et al., 2020). This age group showed the highest increase in screen habits, accounting for television time, Internet time, video games, and multiple screens at once. It was concluded that excessive screen time should be avoided, and instead individuals should seek to establish behaviors of engaging in exercise, particularly outdoors. However, the study did not account for utilization of social media to engage in exercise. Comparatively in the current investigation, 31.6% of the participants indicated they were using social media workout videos prior to lockdown protocols, which subsequently this increased to 52.8% during M-M 2020, as determined by the current investigation. As Brand et al. (2020) stated, exploring changes in exercise frequency is necessary, and it is also most important to learn whether exercise was done
at all (Brand et al., 2020). Given the lack of exercise resource availability during restrictions, alternative modalities of exercise were explored. Notably, 28.9% participants reported purchasing workout equipment for their home, with the primary modalities being free weights (45%) and resistance bands (32%). Despite a negative decline in exercise engagement among participants, individuals made efforts to innovate their exercise regimen with new home equipment and social media workout videos.

Vartanian & Shaprow’s 2008 study found that weight stigma experiences were directly related to BMI and body dissatisfaction, and most notably, stigma experiences were correlated to an increased desire to avoid exercise (Vartanian & Shaprow, 2008). There was a 32.7% increase in negative body image (NBI) perception during M-M 2020, making the overall report of respondents experiencing negative body image at the time to be 74.7%. Potentially, the prevalence of negative body image among the participants in the current investigation could enhance the explanation of the decrease in physical activity. In addition, almost half of respondents reported that fitness/health influencers did not play a role in this NBI perception (48.4%), while only 17.8% report social media fitness/health influencers did contribute. This contradicts the general conclusion from previous research, which observed a significant effect of appearance-focused or fitness social media accounts with feelings of body dissatisfaction (Casale et al., 2019). Fitspiration is believed to have the goal of supporting healthy living, however, the current literature has noted misinformation with negative effects on emotional wellbeing, and vulnerability/protective factors (Easton et al., 2018). As fitness/health influencers are the primary source of fitspiration on social media platforms, exposure to its subcategories of thinspiration
and bonespiration are suggested to have a more severe negative effect compared to fitspiration posts (Alberga et al., 2018). This study observed that the majority of participants reported fitness/health influencers on social media did as not playing a role in everyday lifestyle throughout the study’s timeline (as shown in Table 4). As a result, the association of increased social media exposure and NBI, with any contribution from fitness/health influencers on social media cannot be concluded. However, future research is encouraged to investigate the NBI prevalence among different kinds of influencers outside of the fitness/health scope.

A self-perceived observed weight increase (41%) was noted during the period of M-M 2020. Among the different classifications, those who reported an increase in body weight during M-M 2020 were 18.6% of freshmen, 22.0% of sophomores, 20.3% of juniors, 21.2% of seniors, and 17.8% of graduate students. Interestingly this suggests that weight increases during this period were not dependent on the specific year of college. However, previously Racette et al. (2008) demonstrated that college students experience increases in body weight and BMI throughout the four years of college (Racette et al., 2008). However, a limitation of this measure in Racette et al.’s group and the present is that the changes in body weight were not specific to body compositional changes (i.e. fat vs. lean tissue). It is likely that weight increases are more indicative of increased adipose tissue since there was a synonymous decrease in physical activity, and this, muscle accretion was unlikely. Additionally, 29% of Racette et al.’s freshman participants, and 25% of their senior participants, indicated that they did not exercise regularly. Relatively, 19.1% of the freshman participants and 20% of senior participants within the current study indicated that they did not exercise on a regular basis. This would coincide with data from
The American College Health Association’s National College Health Assessment in 2003, showing that exercise patterns during freshman and senior years typically do not meet the recommended guidelines for nearly one third of students on a national scale (American College Health Association).

As the stay-at-home orders were instituted throughout most of the United States, Nielsen reported a 54% increase in national sales of alcohol for the week of March 21, 2020 (Nielsen, 2020). Compared with the prior year, online alcohol sales increased 262% from 2019 (Nielsen, 2020). The SWB component of alcohol studied in the present investigation showed that there was an overall increase in alcohol consumption frequency by 20% from before M-M 2020 to during M-M 2020, and a 21% increase from during M-M 2020 to their return-to-campus. In regards to alcohol volume, the light and medium alcohol volumes as described by the National Institute on Alcohol Abuse and Alcoholism, were maintained before, during, and return-to-campus timelines. However, heavy volume consumption (15+ units/week) increased from 8.0% before M-M 2020, to 14.6% during M-M 2020. Pollard et al. studied changes in alcohol use and associated consequences during the COVID-19 pandemic, and found that on average, alcohol was consumed one day more per month by 3 out 4 adults (Pollard et al., 2020). Among their female participants, there was an average increase in the Short Inventory of Problems Scale of 39% compared to the previous year, which is suggestive of increased alcohol-related problems independent of consumption level for nearly 1 in 10 women (Pollard et al., 2020). The current study did not investigate the difference in alcohol consumption among genders, however, the participants are in the low adult age cohort, and would offer some comparability with Pollard et
al.’s findings of a range of negative physical health associations and that excessive alcohol use may worsen existing mental health problems, such as anxiety or depression (Foulds et al., 2015).

Mental health problems are likely to play a major role for why college students behaved and adapted to the quarantine lifestyle in various behaviors (e.g. reduced physical activity, increased sedentary behaviors, etc.). Researchers at Texas A&M University released a mental health-focused interview study on the effects of COVID-19 on college students, and found that 71% of their participants experienced an increase in stress and anxiety due to COVID-19 (Wang et al., 2020). Specific stressors that contributed to this increase included fear and worry for one’s own health and that of their loved ones, difficulty concentrating on work, disruptions to sleeping patterns, decreased social interactions due to social distancing, and increased concerns on academic performance. The current study’s participants showed a large decrease in social interactions, with 64.1% engaging in social gatherings more than three times per week before M-M 2020, down to 24.1% during M-M 2020. Furthermore, 33.9% of our participants indicated that they did not have an optimistic outlook during M-M 2020. Feelings of overall control on life went from 55.4% before M-M 2020 to 14.3% during M-M 2020. These reports conclude that the COVID-19 M-M 2020 period had a significantly negative effect on individuals’ mental perspectives.

There are limitations within the current investigation. Firstly, this was a self-reported survey, which could have inaccurate reports and subsequent misleading conclusions. Furthermore, the research on how COVID-19 lockdown protocols affected physical activity is
extremely minimal, among other variables such as general health, location, and specified populations, which makes it difficult to corroborate findings with other studies. Also, as the data was collected from one university, the conclusions discussed may not generalize to all college students throughout the United States, or universities around the world. Nonetheless, owing to the heterogeneous measures taken of utilizing virtual classroom schedules and work-from-home transitions, we can expect a relative manner of generalizability with our findings. It is also important to note that the relationships speculated throughout the present study do not allow causal inferences to be made. Finally, we did not analyze social contexts such as income, religion, or substance use to further describe the findings, which makes it difficult to confirm the changes found during the transition periods to be primarily linked to the COVID-19 pandemic.

We can concur that going through a similar lockdown protocol, which the majority of Americans endured for the few peak months of 2020, is undesirable and potentially leads to mental instability among college aged individuals at all levels (undergraduate and graduate). As such, it is important to consider how people responded, as well as adapted in order to reevaluate future transitional periods. Future research is needed to strengthen these findings between physical activity, social media usage, and subjective wellbeing during COVID-19 lockdown protocols. College aged individuals are minimally studied during this timeframe, which calls to action future investigations on a national scale to account for students in different universities across the nation. A larger number of similar investigations can assist in determining the negative effects of lockdowns on college students in order to find solutions to improve the physical and mental health if another public health crisis arises. Concrete relationships are
needed to approach authorities in universities and healthcare environments in order to implement changes for the betterment of students and young adult patients. For example, universities could increase communication with their student body for means of establishing mental and physical health resources and opportunities. Furthermore, fitness/health social media influencers can be presented information on how to better address their audiences in accordance to their overall wellbeing, instead of primarily using a platform for self-promotional means. If social media influencers, university authority figures, and health care practitioners can prioritize mental health support and physical activity encouragement to their respective audiences of young adults, there could be a less severe deterioration of overall wellbeing as remote working and school remains an option and in future health crisis’s such as those experienced during the 2020 COVID-19 pandemic.
**Future Applications**

In many ways, the current pandemic has put a mark on humanity that will last for decades. COVID-19 has taken the lives of 2.4 million people thus far, with millions more who have endured severe illness. The United States witnessed a decrease in life expectancy by an entire year within the first six months of 2020. According to the International Monetary Fund, the global economy will lose more than $22 trillion between 2020 and 2025. Furthermore, UNICEF predicts the pandemic will result in a “lost generation” (Sidhu, 2020). As symptoms of inflicted children remain mild, the rise of global infections and longer-term impact on education, nutrition, and well-being of an entire generation of children and young people are at serious life-changing risk. They report that as of October 2020, 265 million children were missing school meals globally, and there was a 40% decrease in coverage of nutrition services for women and children across 135 countries (Sidhu, 2020). Alarmingly, the global number of children living in multidimensional poverty (no access to education, nutrition/health services, housing, sanitation or water) is estimated to have soared by 15 percent, or an additional 150 million children by mid-2020 (Sidhu, 2020). This data poses a significant threat to the future of youths around the world.

Public health in the United States has been an overlooked and underfunded sector of the government and general population since its establishment. However, the presence of the novel coronavirus engulfing the globe entered the US and the light of public health changed. All of a sudden, public health terminology became common language such as flattening the curve, social distancing, contact tracing, and herd immunity. In the perspective of Umair Shah, MD, MPH,
and executive director of the Harris County Public Health Department in Houston, public health is one of those things in which it only gets attention when it is compromised and is posed a real, unavoidable threat.

Public health officials found 2020’s pandemic crisis as an opportunity to educate and validate the value of public health interventions to encourage pro-health policies and more funding that has been long endeavored. It highlighted the unique dynamic of US government officials and public health professions, how they have long been divided until the coronavirus crisis made doctors and nurses working as first responders became recognized as public health practitioners. This new union is speculated to give the US a better network of communication when future similar crises arise. Furthermore, the new technology of contact tracing and speed of information had never been seen before in the public health realm. Contact tracing is not a new practice by any timeline, but it was not widely appreciated and utilized in the past. The previous contact tracing was also performed in-person, due to the task surrounding tuberculosis and sexually transmitted infections. COVID-19’s widespread transmission and high contagion level did not allow for this on-foot protocol, and allowed attention and efforts to create a highly effective technology for virtual tracing and surveillance. This significant improvement in the surveillance system gives the nation another advantage for dealing with future virus outbreaks.

Despite these beneficial adaptations, the US still has a need to direct more focus on expanding broadband internet access not only for accurate information to be shared on frequent and current basis, but also for the increased use of telehealth. As of 2019, 73% of Americans had
broadband access, only 63% of Americans in rural communities had broadband internet, according to the Pew Research Center.

As researchers all over the world find out more about the novel coronavirus, variants and mutations are born and are being spread as well. According to the New York Times, there are seven known variants, with six identified mutations that enhance the virus function of latching and binding to human host cells. Therefore, it is unwise to believe that the public health threat of 2020 will be the only crisis to come from the coronavirus. However, the strides that were made from the 2020 pandemic has improved the public health system of governments all over the world, which strengthens the preparation and resources in place in the event humanity is struck with another spike or novel virus. Due to the improvements to the national health surveillance system, communication between physicians and government officials, and the incentive to increase broadband internet access, Americans are put in a better position to not endure another severe quarantine amidst another public health threat. One can hope to keep businesses open (however limited capacity) such as recreation centers, local gyms, and fitness facilities to allow patrons to continue physical activity regimens and relatively interact in-person. These two components alone, however small, were proven in the present study to have played a significant impact in the deterioration of college students’ physical and mental wellbeing. If pro-health policies are established and public health continues to grow in importance to keep businesses from completely shutting down for months on end (with no re-opening expectations in sight) when a different health threat attacks, society will be better apt to function in a way that will be less detrimental to the physical activity levels and mental health of individuals.
Conclusion

In conclusion, it is important to learn how people responded and adapted during this time to reevaluate future transition periods for improved health outcomes. Additional research is justified to strengthen the findings between physical activity, social media usage, and subjective wellbeing during isolating events. More research can help identify relationships between the cancellation period and physical activity, social media, mental health, and subjective wellbeing that were explored in this study to better determine what social media influencers, health practitioners, and university health resources can be utilized for improved population health outcomes in future events.
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