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RESEARCH ARTICLE

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How did the COVID-19 Lockdown Affect Hispanic University Students' Daily Life?

Hongwei Wang[1*#], Muhammad Mohebujjaman[1#], Fernando G. Quintana[2], Melissa Villarreal[2]

[1]Department of Mathematics and Physics/Texas A&M International University, Laredo, TX, U.S.A.
[2]Department of Biology and Chemistry/Texas A&M International University, Laredo, TX, U.S.A.
[#]Authors Contributed Equally.

ABSTRACT

Objective: COVID-19 has changed dramatically, including the schedules of university students. We wanted to see what and how have been changed.

Methods: We designed a questionnaire including multiple choice questions and fill in questions about student well-being before and during the COVID-19 lockdown to students at Texas A&M International University located in South Texas and analyzed the changes we observed in their daily food intake, physical activity, and sleep patterns. The questionnaire also included demographic questions. 393 students were sent the questionnaire in total. After cleaned the outlier, 387 entries were kept for data analysis.
Results: Our results indicate that the COVID-19 lockdown decreased the time that students spent on physical activities and sleep per week. By contrast, we found no association between lockdown and body mass index (BMI) changes.

Conclusion: Our results suggest that local university needs to provide free fitness classes and events to encourage student' physical activity. The university can also host free workshops to guide students toward healthier sleep patterns. Cafeteria department on campus should design healthy meal plans so students are given the option of a more balanced daily dietary intake.

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Brief Description

In order to improve the college life quality after the hit of pandemic, we analyzed the impact of the lockdown during COVID-19 in Texas A&M International University in South Texas. By giving an online survey, we have found that the lockdown during COVID-19 has changed college students' daily life in certain way such as the daily dietary, physical activity and sleep quality. This paper provides a brief overview of the impact of the lockdown in college life.

Key Points

- Lockdown during the COVID-19 has decreased the time students spent on physical activity every week.
- Lockdown during the COVID-19 has decreased the time students spent on sleep every week.
- By contrast, we found no association between lockdown and body mass index (BMI) changes.

Introduction

In late 2019, a novel coronavirus, now known as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), was first reported in Wuhan, China. It quickly spread worldwide, and the coronavirus disease 2019 (COVID-19) was declared a global pandemic in March 2020 by WHO [1,2]. To slow the spread of the virus, many nations enforced lockdown procedures, forcing millions of people to quarantine in their homes.

A prolonged quarantine can have profound, negative psychological effects including fear, frustration, boredom, anxiety, and post-traumatic stress among other forms of psychological distress [3]. Thus, quarantining can dramatically increase stress in individuals, and this uncontrollable stress can result in unhealthy coping mechanisms.

When undergoing stress, organisms produce a physiological response to try to maintain homeostasis. One common physiological response to stress is a dietary change [4]: studies show that stressed individuals are more likely to crave unhealthy foods high in carbohydrates, fats, and caloric density because they activate the brain's reward center [5]. Additionally, prolonged quarantine dramatically reduces social interactions, gatherings, and daily routines. This sudden interruption of routine and forced isolation could result in boredom, which is associated with higher consumption of calories and snacking and is a predictor of eating behaviors [6]. Thus, the combination of high levels of stress and boredom can lead to unhealthy eating behaviors as well as other unhealthy coping mechanisms, such as video games.

Contact Hongwei Wang ✉ Texas A&M International University, LBV 315, Laredo TX 78041, U.S.A.

On March 19, 2020, Governor Greg Abbott signed his first coronavirus-related executive order (GA-08) that signaled the start of the Texas's lockdown with a prohibition of social gatherings of more than 10 people and mandated the closure of dine-in restaurants, nursing homes, and schools. On March 31, the City of Laredo directed non-essential businesses to close and residents to remain in their homes in the "Stay Home, Work Safe" emergency orders. The order directed residents to shelter at home except for crucial errands and job duties [7].

Hispanics living in this area, or Mexican, experience a disproportionately high levels of poverty [8,9] is associated with lower diet quality and less consumption of fruits and vegetables [10]. For those of Mexican origin, socioeconomic status is a great predictor for determining dietary patterns. Third-generation Mexicans with higher socioeconomic status generally have higher quality dietary patterns compared to low socioeconomic third-generation Mexicans, who had the lowest dietary quality [11]. Also, the diet quality tends to worsen as generations increases, and this generational dietary decline in Hispanics is noted in literature [11]. Furthermore, acculturation of Hispanics in the United States is linked to lower diet quality, which can increase their risk for obesity.

Studies show that young Hispanics who assimilate are more likely to have poorer eating behaviors compared to Hispanics integrated into their own culture [12-14]. Therefore, the combination of being a young Hispanic with low socioeconomic status can increase the chances of having a low-quality diet. The lockdown continued for more than three months, causing negative lasting effects on people's health, such as anxiety, stress, frustration, sleep deprivation, and decreased physical activity. When people undergo quarantine, their stress levels increase when they can not leave their homes, and this can impact their mental well-being. Mental well-being is a multidimensional construct that includes positive emotions, engagement in meaningful activities, purpose in life, a sense of accomplishment, and interpersonal relationships [9,15]. If people's mental well-being is affected by the lockdown and social distancing, this can lead to drastic changes to aspects of their lifestyle such as sleeping patterns. Sleep, known for its role in strengthening immunity and providing rest, can also affect individuals' mental well-being [16]. The prevalence of sleep disorders has increased due to increased stress levels, decreased mental well-being, and decreased social interaction during the lockdown. These sleep problems may be aggravated in older adults, which in turn may impair their immune responses to COVID-19 [16].

Thus, mental well-being can have an enduring effect on people's health and lifestyle. Another health issue that can be impacted by mental well-being is physical activity. Mental well-being may enhance mood or indirectly improve physical health. However, despite the importance of physical activity in reducing mortality and morbidity, modern lifestyle behaviors often encourage inactivity [9,15]. Prior research has suggested that physical activity and time spent outside are both associated with increased well-being [17]. Due to the lockdown and social distancing and mask-wearing mandates, many people were not able to exercise outdoors, in gyms, or with their friends. Lack of exercise can increase stress levels and decrease mental well-being [18,19].

In the United States, an estimated 40-45% of college students engage in fitness activities regularly (at least three days per week) [20]. When the COVID-19 lockdown began, however, they were forced to stay indoors [9]. Without physical activity, people cannot reduce their stress and anxiety levels to achieve a positive mindset and well-being [18,19]. Therefore, COVID-19 significantly impacted Hispanic health and mental well-being. Previous research [21] has indicated that the COVID-19 lockdown negatively impacted on the physical activity levels, sleep and well-being of a group of physically active Spanish adults. Other studies [22] indicated that the impact of COVID-19 restrictions on health and well-being may accumulate over time. This study focused on the association between the COVID-19 lockdown and the well-being of Hispanic university students and attempted to identify changes in their lifestyle including dietary intake, sleep patterns, physical activity, and BMI measurements. Compared with other studies, we examined college students who may or may not have been active before the lockdown. Our results show that the COVID-19 lockdown has not caused significant changes in BMI.

Materials and Methods

Design and participants

In Survey Monkey, we designed a questionnaire to examine university students' dietary intake, physical activity, and sleep patterns before and during the COVID-19 lockdown. We sent a recruitment email, inviting students to voluntarily participate, to 393 students who were enrolled in a Biology class in Fall 2020 at Texas A&M International University.

Questionnaire design and measures

The before and during COVID-19 lockdown questionnaires included four sections: physical activity, dietary intake, sleep quality, and sociodemographic information.

Variables

The first section of the questionnaire, including fill in questions and multiple choice questions, asked about the physical activity students took part in before and during the COVID-19 lockdown, including the time in minutes spent on physical activity in total and the time in minutes spent in each category of physical activity, including cross-training, outdoor running, outdoor walking, outdoor cycling, strength training, American football, Soccer, Yoga, indoor walking, indoor running and boxing. The questionnaire included questions about the reason for their decrease (if any) in physical activity during lockdown (lack of park access, lack of gym space, lack of equipment, lack of coaching, lack of motivation, and lockout). The variables for physical activity before and during COVID-19 lockdown were the total amount of time in minutes each student spent exercising.

The second section of the questionnaire was about students' sleep quality before and during the COVID-19 lockdown, including whether the 10 p.m. to 5 a.m. curfew ordinance affected their sleep quality, how it affected their sleep quality

(increasing or decreasing on the number of hours of sleep received), and the reason for changes in the number of hours of sleep (boredom, increased social media and computer time, stress, etc.). It also asked students the number of days in one week that they slept before 10 p.m. and for at least seven hours. The variables for sleep quality before and during the COVID-19 lockdown were the number of days students slept before 10 p.m. and received at least seven hours of sleep.

The third section of the questionnaire asked about dietary intake before and during the COVID-19 lockdown. It began by asking students if their dietary intake habits changed (improved or worsened) during the lockdown. Then it asked the number of days over one week that they ate orange vegetables (tomatoes, red peppers, carrots, sweet potatoes, winter squash, and pumpkin), dark green vegetables (broccoli, spinach, dark lettuce, turnip greens, and mustard greens), whole grains (whole wheat, oats/oatmeal, rye, barley, corn, popcorn, brown rice, wild rice, buckwheat, triticale, bulgur, millet, quinoa, and sorghum), protein (chicken, beef, pork, lamb, tofu, fish, shrimp, egg) and the amount of each type of food (raw weight) before and during the COVID-19 lockdown. The variables for dietary intake before and during COVID-19 lockdown included the amount of all types of food.

The last section of the questionnaire aimed to obtain student sociodemographic information, including ethnicity (Hispanic, White, Black), age, gender, weight (before and during the COVID-19 lockdown), height, employment status (part-time, full-time, or unemployed), highest academic achievement level (some high school, high school, some college, associate degree, bachelor degree, master degree or Ph.D.), marital status (single, married, divorced, or widowed), and family income range (up to $20,000, $20,000–39,9999, $40,000–59,999, or more than $60,000). Based on the height and weight provided, we calculated students' BMI before and during the lockdown.

Statistical analysis

We conducted t-tests to determine whether there were significant differences before and during the COVID-19 lockdown in students' dietary intake, physical activity, and sleep patterns. We used descriptive statistics to report the sociodemographic characteristics of those who completed the questionnaire, and we used Rstudio to complete all statistical analyses.

Results

Of the 393 students enrolled in Biology class, who participated in the online survey, 93.85% were Hispanic. Female participants' rate was 78.72% and 21.28% for males.

Because the majority were full time students, 68.81% unemployed, 25% were employed part time and the remainder were full-time. Table 1 presents additional sociodemographic data of the sample that completed the questionnaire.

Physical activity

When asked whether the COVID-19 pandemic restricted accessibility to preferred exercise, more than 70% of participants said yes, which is shown in Figure 1.

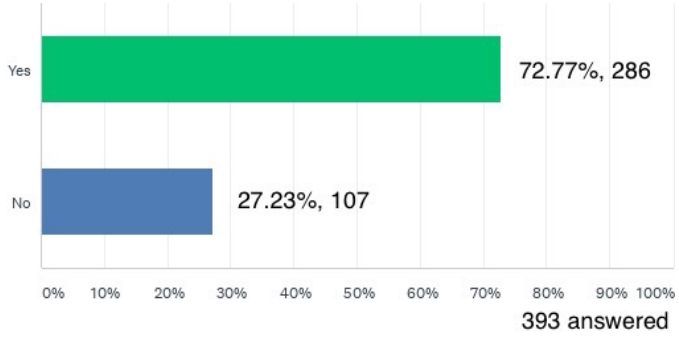

Figure 1: Has the COVID-19 lockdown restricted your accessibility to preferred exercise equipment?

When asked the reasons for the decrease in the exercise experienced during the COVID-19 lockdown, the largest selected reason was a lack of motivation (44.87%), followed by a lack of equipment (22.31%), a lack of gym space (16.92%), lockout (8.97%), a lack of park access (5.64%), and lack of coaching (1.28%). Figure 2 displays these results. A significant difference between the physical activity before and during the COVID-19 lockdown (p-value = 0.04). The mean time students spent in physical activity was 264.21 minutes every week before the lockdown and 156.40 minutes during the lockdown-a decrease of 107.81 minutes.

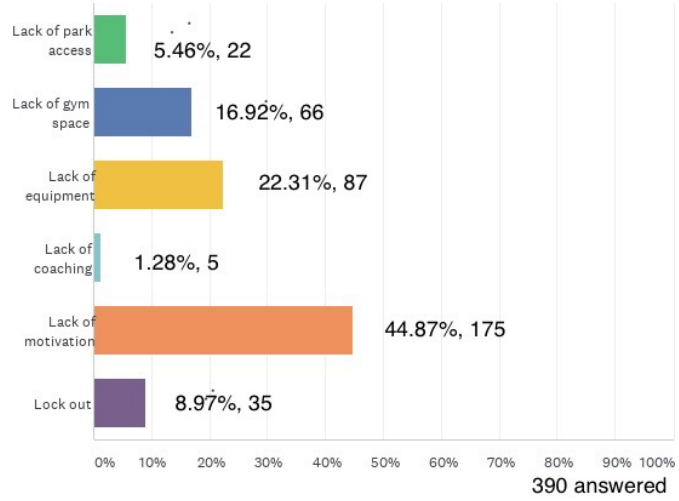

Figure 2: The reasons for the decrease in the exercise you experience during the COVID-19 lockdown.

Sleep quality

When asked the reason for the decrease in the number of hours of sleep received each night, the largest reason selected was an increase in social media and computer time (46.44%), followed by stress (26.36%), boredom (19.67%), and other (7.53%). The results are shown in Fig 3. A significant difference exists between students' sleep patterns before and during COVID-19 lockdown (p-value = 2.85e-07). The mean days students slept at least seven hours or went to sleep before 10 p.m. over one week was 9.63 days out of 14 before lockdown and 6.32 days out of 14 during the lockdown, which indicates an average decrease of 3.31 days.

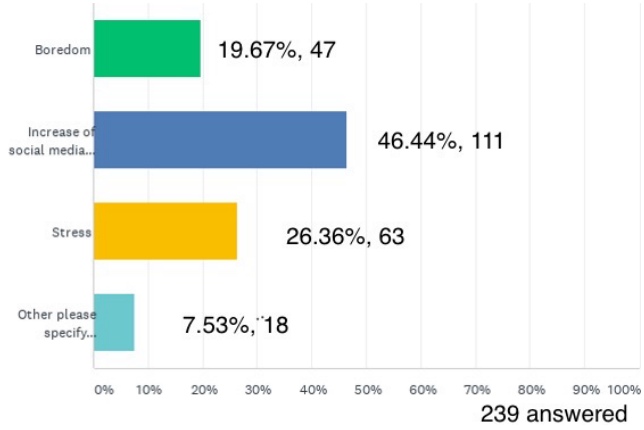

Figure 3: The reasons for the decrease in number of hours of sleep during the COVID-19 lockdown.

Table 1. Participant sociodemographic characteristics.

Characteristic	%
Ethnicity	
Hispanic	93.85
White	4.36
Black	1.03
Others	0.77
Gender	
Male	21.28
Female	78.72
Employment status	
Part-time	25.00
Full-time	6.19
Unemployed	68.81
Highest academic achievement level	
Some high school	3.60
High school	44.73
Some college	39.59
Associate degree	10.54
Bachelor degree	1.03
Master degree	0.26
Ph.D.	0.26
Marital status	
Single	96.93
Married	2.81
Divorced	0.00
Window(er)	0.26
Family income range	
Up to $20,000	35.13
$20,000-39,999	27.95
$40,000-59,999	14.36
More than $60,000	22.56

Table 2. Daily mean values of consumption of different categories of food over one week.

Food category	Before lockdown	During lockdown	Change	Sig.
red and orange vegetables	4.59	9.88	5.28 (10.98)	0.00
dark green vegetables	11.90	9.55	-2.35 (9.60)	0.21
whole grain food	15.27	12.62	-2.65 (10.66)	0.22
protein food	19.83	19.22	-0.61 (5.63)	0.72

Standard deviation is provided inside the parentheses.

Table 3. Changes over time in physical activity, sleep quality, dietary intake and BMI due to the COVID-19 lockdown.

Variable	Before	During	Change	[95% *C.I.*]	Sig.
Physical activity	264.21	156.40	-107.81 (356.88)	[3.34, 212.29]	0.04
Sleep quality	9.63	6.32	-3.31 (5.84)	[2.08, 4.54]	2.85e-07
Dietary intake	57.04	51.28	-5.76 (18.16)	[−5.22, 16.74]	0.30
BMI	25.51	25.87	0.36 (3.10)	[−1.87, 1.15]	0.64

Standard deviation is provided inside the parentheses.

Dietary intake

Table 2 represents daily mean values of the consumption of food before and during the COVID-19 lockdown, by food category. The measurement of food is one cup in raw weight. There is no significant change in any of the food categories except the red and orange vegetables as a result of the COVID-19 lockdown ($p \geq 0.05$). A significant increase exists between students' amount in taking red and orange vegetables before and during the COVID-19 lockdown ($p \leq 0.00$). There is no significant difference in students' dietary intake before and during the COVID-19 lockdown (p-value = 0.30).

Dietary intake, which is the summation of the four categories listed in Table 2, was 51.14 before the lockdown and 51.27 during the lockdown. There is no significant difference between students' BMI before and during the COVID-19 lockdown (p-value = 0.64). BMI, calculated with the provided weight and height, did not change significantly as a result of the lockdown. Table 3 shows the changes over time in physical activity, sleep quality, dietary intake, and BMI due to the COVID-19 lockdown. Table 3 provides a summary of the statistical analysis results.

Discussion

The fast spread of COVID-19 led to many countries enforcing unprecedented, strict lockdown measures and social distancing guidelines, which forced many people to be confined in their homes for an extended period. This form of confinement and self-isolation can lead to various changes in lifestyles and daily activities.

This study examined the impact of the COVID-19 lockdown on Hispanic university students' physical activity, sleep patterns, dietary intake, and BMI. The data clearly indicates that the COVID-19 lockdown significantly impacted students' sleep patterns and physical activity. This reduced physical activity aligns with conclusions from previous research [18,19]. Curtis et al. [22] noted that the effects of COVID-19 restrictions on lifestyle were insignificant. However, we find no significant change in dietary intake and BMI measurements.

Contrary to initial expectations, the dietary intake and BMI measurements remained constant before and during lockdown. There were no significant changes in these two variables. The before lockdown baseline for dietary intake was recorded at 51.14 and during lockdown it was recorded

at 51.27. While there was a slightly increase in quality, it was not a significant change. Similarly, the average BMI before lockdown was 25.51 and during lockdown was 25.58. Again, there was a slight increase in the average BMI, but it was not a significant change. A BMI of 25 is considered to be overweight [23]. The survey population in this case remained overweight before and during the lockdown, and the difference was not statistically significant.

The statistics demonstrate that some Hispanic university students slept less due to the strict rules they had to follow such as staying in their dorms and following CDC guidelines. The average sleep quality before lockdown was 9.63 and during the COVID-19 lockdown it changed to 6.32. The amount of physical daily activity before the lockdown was 264.21 minutes per week and decreased to 156.40 minutes per week during the lockdown.

Overall, there are perceivable changes in immediate daily activity during the lockdown such as a decrease in sleep quality and physical activities. These two variables significantly changed in the short period of time of the lockdown, which was about 5 months. However, the other two variables, dietary intake and BMI measurements, were not significantly changed as a result of the lockdown period. This could be partially attributed to the time constraint of the survey conducted and more time might have been. More time is needed to accurately show the changes in dietary intake and BMI measurements. Normally, changes in the BMI measurements take a longer time to show, so no changes were seen within the survey's time frame. Also, contrary to other studies, dietary changes should have had an immediate and significant change due to increases in stress, boredom, and other psychological consequences of the lockdown period. Thus, the results may have been affected by the existing low-quality diets of the participants before the lockdown period. Studies focusing on Hispanic populations are important because this demographic is often underrepresented in areas of research.

Limitations in this research exist in questionnaire design, sample selection, and time constraints of the questionnaire. Acculturation is an important contribution to lower diet quality among Hispanics and should be better if acculturation was measured in future studies. Additionally, the sample comprised students enrolled in Biology class on campus, which might not accurately represent the entire student body. The length of the study should be long enough to see the impact of the COVID-19 lockdown on students' health. It was about five months into the pandemic when we sent out the questionnaire. Further studies should avoid these limitations to show both the immediate and long-lasting impacts of COVID-19 on this population.

Conclusion

This research contributes to the understanding of the impact of the COVID-19 lockdown on students' well-being. Furthermore, the study confirms that the statistically significant change in BMI requires longer time period. It is not surprising that the current COVID-19 pandemic is significantly negatively impacting college students' daily life. The current pandemic may further exacerbate existing problems. The timeline of the pandemic remains uncertain and may continue to impact students' physical activity, sleep quality, and dietary intake into the future. Future research is planned to compare the lockdown experiences of high-school and middle-school students across the entire South Texas area and explore long-term well-being impacts. Additional studies investigating the effect of the pandemic on populations outside of schools may provide a better understanding of the impact of COVID-19 on public health. During COVID-19 pandemic, many students will continue to require special assistance and experience emerging challenges that will require responsive measures by colleges. Our results suggest that the university provides free fitness classes and events to encourage students' physical activity. Further, it can host free workshops to guide students toward a healthy sleep patterns. Moreover, the cafeteria should design healthy meal plans to help students achieve a balanced daily dietary intake.

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References

1. World Health Organization. Novel Coronavirus (2019-nCoV): situation report 11.
2. Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. Acta Biomed. 2020; 19; 91(1): 157-160.
3. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. The Lancet. 2020; 26; 395(10227): 912-920.
4. Yau YH, Potenza MN. Stress and eating behaviors. Minerva Endocrinol. 2013; 38(3): 255-267.
5. Ingram J, Maciejewski G, Hand CJ. Corrigendum: Changes in diet, sleep, and physical activity are associated with differences in negative mood during COVID-19 lockdown. Frontiers in Psychology. 2020; 11.
6. Moynihan AB, Tilburg WA, Igou ER, Wisman A, Donnelly AE, et al. Eaten up by boredom: consuming food to escape awareness of the bored self. Frontiers in Psychology. 2015; 6.
7. City of Laredo/state of Texas COVID-19 timeline https://www.cityoflaredo.com/Coronavirus/assets/COVID-19_Timeline.pdf
8. Alexa U. Latest census data shows poverty rate highest at border, lowest in suburbs. The Texas Tribune. 2016; 19.
9. U.S. census bureau quickFacts Laredo city, Texas https://www.census.gov/quickfacts/laredocitytexas
10. Kendall A, Olson CM, Frongillo EA. Relationship of hunger and food insecurity to food availability and consumption. J. Am. Diet. Assoc. 1996; 96(10): 1019-1024.
11. Martin MA, Van Hook JL, Quiros S. Is socioeconomic incorporation associated with a healthier diet? Dietary patterns among Mexican-origin children in the United States Soc Sci Med. 2015; 147: 20-29.
12. Hu D, Taylor T, Blow J, Cooper TV. Multiple health behaviors: patterns and correlates of diet and exercise in a Hispanic college

sample. Eating Behaviors. 2011; 12(4): 296-300.

13. Arandia G, Sotres-Alvarez D, Siega-Riz AM, Arredondo EM, Carnethon MR, et al. Associations between acculturation, ethnic identity, and diet quality among U.S. Hispanic/Latino youth: findings from the HCHS/SOL youth study. Appetite. 2018; 129: 25-36.

14. Jeffery T, Ardakani A, Monroe-Lord L, Ordonez-Mendez M. P113 relationship between acculturation and diet quality among Hispanic adolescents. J Nutr Educ Behav. 2020; 52(7): S69-S70.

15. Smit AN, Juda M, Livingstone A, Stephanie RU, Mistlberger RE. Impact of COVID-19 social-distancing on sleep timing and duration during a university semester. PLOS ONE. 2021; 16(4): 1-22.

16. Park KH, Kim AR, Yang MA, Lim SJ, Park JH. Impact of the COVID-19 pandemic on the lifestyle, mental health, and quality of life of adults in South Korea. PlOS ONE. 2021; 16(2): 1-13.

17. Doubleday A, Choe Y, Isaksen TB, Miles S, Errett NA. How did outdoor biking and walking change during COVID-19?: A case study of three U.S. cities. PLOS ONE. 2021; 16(1): 1-13.

18. Stanton R, To QG, Khalesi S, Williams SL, Alley SJ, et al. Depression, anxiety and stress during COVID-19: associations with changes in physical activity, sleep, tobacco and alcohol use in Australian adults. Int. J. Environ. Res. 2020; 17(11): 4065.

19. Skrlec I, Talapko J, Pustijanac E, Me˘strovi´c T. Depression, anxiety, stress and physical activity in health-related university students during COVID-19. InProceedings. 2021; 11: 1-6.

20. NYU. Physical activity. https://www.nyu.edu/life/safety-health-wellness/live-well-nyu/priority-areas/physical-activity.html

21. Martinez-de-Quel O, Suarez-Iglesias D, Lopez-Flores M, Perez CA. Physical activity, dietary habits and sleep quality before and during COVID-19 lockdown: a longitudinal study. Appetite. 2020.

22. Curtis RG, Olds T, Ferguson T, Fraysse F, Dumuid D, et al. Changes in diet, activity, weight, and wellbeing of parents during COVID-19 lockdown. PLOS ONE. 2021; 16(3): 1-14.

23. Wang H, Quintana FG, Lu Y, Mohebujjaman M, Kamronnaher K. An application of ordinal logistic regression model to a health survey in a Hispanic university. BMC Public Health. 2021.