

## Patterns of physical activity and eating habits during COVID-19

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### Abstract

*The purpose of this research was to examine the immediate impacts of quarantine restrictions on movement and dietary patterns in a small community in the southeastern United States. A sample of individuals (N = 209) completed an online survey indicating levels of physical activity and satisfaction with eating habits before and during the COVID-19 quarantine. Of those surveyed, 46.2% of adults indicated physical activity decreased during quarantine, while 53.3% indicated satisfaction with eating habits decreased. Despite these results, individuals did not indicate a desire to change current habits.*

*An important limitation of this study was a lack of distinction in study design between decreased levels of physical activity (PA) and increased sedentary behaviour (SB). An additional limitation was the design of survey questions to address behaviours affected by the unprecedented COVID-19 pandemic. Future research should include changes to study questions reflecting updated knowledge of COVID-19. This study demonstrated the immediate adverse effects of COVID-19 on habits and attitudes toward behaviour change. Providing participant educational infographics offering healthy lifestyle tips for behaviour change during the COVID-19 pandemic may be of benefit.*

### Introduction

An extensive amount of literature exists touting the benefits of engaging in moderate-to-vigorous physical activity (PA), limiting sedentary behaviour (SB), and eating a healthy diet for the prevention of chronic disease. While engaging in these habits is essential for health, the global coronavirus disease pandemic (COVID-19) and quarantine restrictions posed challenges for individuals to maintain healthy behaviours. As the virus spread globally, policies of home confinement and self-isolation were imposed to “flatten the curve,” but these restrictions also put individuals at increased risk of developing health problems independent of COVID-19 (Matrajt & Leung, 2020).

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Potential stress induced by quarantine restrictions, compounded by reduced PA and increased caloric intake, could adversely impact the health of individuals immediately and in the long-term. The United States Physical Activity Guidelines for Americans, 2nd edition, recommends that adults should regularly engage in moderate-to-vigorous PA to confer benefits to cardiometabolic health. Individuals should aim for a weekly goal of 150-300 total minutes of moderate intensity PA, 75-150 minutes of vigorous intensity PA, or an equivalent combination of durations and intensities (U.S. Department of Health and Human Services [HHS], 2018). COVID-19 quarantine restrictions potentially changed the time, location, and accessibility for individuals to engage in PA. Mandatory closures of health clubs, parks, and green spaces challenged individuals' efforts to meet recommended PA guidelines (Slater et al., 2020).

In addition to increasing PA, it is important to reduce the amount of time spent in SB. Several organisations, including the American Heart Association, American College of Sports Medicine, Centers for Disease Control and Prevention, and the National Heart, Lung, and Blood Institute have linked SB with a greater risk of all-cause morbidity and mortality (Centers for Disease Control and Prevention, 2019; Lavie et al., 2019; NIH & NHLBI, 2001; Reibe et al., 2018). Most health authorities agree that SB should be limited, but there is little guidance regarding the maximum amount of time individuals should spend in SB daily.

COVID-19 also posed challenges for maintaining a healthy diet. Supply chain disruptions and consumer stockpiling altered traditional eating patterns for individuals and families (Hobbs, 2020). The 2020-2025 Dietary Guidelines for Americans state that to reduce the risk of chronic disease, individuals should follow a healthy eating pattern across the lifespan. The Guidelines recommend shifting to healthier food and beverage choices while focusing on the variety of food consumed, nutrient density, and control of portion sizes (DHHS & U.S. Department of Agriculture, 2020). Under stressful conditions such as COVID-19, the quantity of food consumed tends to increase while the quality of food decreases, conflicting with the recommended dietary guidelines (Mattioli et al., 2020). In a study of how the COVID-19 quarantine affected mental health and eating behaviours, Almandoz et al. (2020) found that 72.8% of adults experienced increased anxiety, 83.6% of adults experienced increased depression, and 61.2% of adults engaged in "stress eating". The present study is consistent with these findings, as participants indicated decreased satisfaction with eating habits during quarantine.

Almost every aspect of daily life was impacted by quarantine restrictions: locations for work and school were changed, churches and community centres were closed, and individuals delayed appointments for routine health care services (Czeisler et al., 2020). The physiological and psychological consequences of the COVID-19 pandemic may not be fully understood for some time. The purpose of this study is to examine levels of PA and satisfaction with eating habits before and during the COVID-19 quarantine, and to assess whether individuals thought it was important to reduce levels of SB or to change eating habits in the midst of the current global health crisis.

## Methods

### Participants

Upon Institutional Review Board approval participants (N = 209) were selected from a sample of full-time employees of a state university in the southeastern United States. Participants ranged in age from 21 to 72 and were recruited from an employee pool of approximately 2,100 individuals. All recruitment and data collection were conducted virtually via email and using an online survey tool.

### Materials

The instrument used in the present study was developed by the researcher to measure diet and physical activity habits and attitudes impacted by the unprecedented COVID-19 global pandemic.

To gauge whether levels of PA were affected by the COVID-19 pandemic, participants were asked to rate their level of PA before and during the on-going quarantine. These responses were scored on a scale of 0 to 10, with 0 being completely sedentary and 10 being extremely physically active. Participants were asked to rate on a scale of 0 to 10 how important it was for them to reduce their current level of sedentary behaviour, with 0 being not at all important and 10 being extremely important.

Assessment of individuals' satisfaction with eating habits was similarly structured. Participants were asked to rate, on a scale of 0 to 10, satisfaction with their personal eating habits before and during quarantine, with 0 being completely dissatisfied and 10 being extremely satisfied. Participants were also asked to rate on a scale of 0 to 10 how important it was for them to change their current eating habits, considering whether dietary patterns had changed during quarantine. Included in the survey were four demographic questions: height, weight, gender, and age, as well as an assessment of change in behaviour related to work habits.

### Statistical analysis

Upon data cleaning using a priori criteria to examine missingness and completeness of survey data, a descriptive analysis was conducted to examine the characteristics of the sample. Paired sample *t*-tests were conducted to determine if physical activity scores or scores on satisfaction with eating habits had changed from pre-COVID-19 levels. Statistical significance was set at  $p < .05$ .

## Results

### Participant characteristics

A total of 209 adults completed the survey, and had a mean age of 48.43 (12.00) (see Table 1 for participant characteristics).

Table 1 Participant Characteristics (N = 209)

Characteristics	%
Sex, female	
• Female	83
Occupation	
• Faculty	38.3
• Staff	42.2
• Administration	19.4

### Physical activity before and during COVID-19 quarantine

A paired samples *t*-test was conducted comparing scores on activity at two different times: before and during quarantine. Scores on activity significantly decreased during quarantine compared to pre-COVID-19 quarantine  $t(193) = 2.60$ ,  $p = .01$ . (see Table 2).

### Satisfaction with eating habits before and during COVID-19 quarantine

A paired sample *t*-test was conducted comparing satisfaction with eating habits at two different times: before and during quarantine. Satisfaction with eating habits decreased significantly when comparing during quarantine to pre-COVID-19 quarantine  $t(194) = 2.62$ ,  $p = .009$  (see Table 2).

Table 2 Levels of Physical Activity and Satisfaction with Eating Habits Before and During Quarantine (M ± SD)

	Before Quarantine	During Quarantine
Levels of Physical Activity	5.5 ± 2.2	5.0 ± 2.7*
Satisfaction with Eating Habits	6.1 ± 2.3	5.5 ± 2.6*

Note: \* =  $p < .05$

## Discussion

The purpose of this study was to assess changes in levels of PA and satisfaction with eating habits within a small community of working professionals before and during the COVID-19 quarantine, and to determine whether individuals thought it was important to change these behaviours. The COVID-19 quarantine had a negative impact on health, as evidenced by reduced levels of PA and reduced satisfaction with eating habits compared to pre-quarantine measurements.

This is consistent with the findings of Moore et al. (2020), which demonstrated that Canadian children and youth experienced reduced levels of PA, reduced time spent in outdoor play, and increased time spent in SB during the COVID-19 quarantine. There was a decrease in PA in this sample, and participants indicated only a moderate desire to reduce time spent in SB ( $M = 7.65$ ,  $SD = 2.48$ ).

Stressors that may have led to reduced levels of PA during quarantine included closure of gyms, recreation centres, parks, and green spaces (Slater et al., 2020). Duncan et al. (2020) found that reduced levels of PA were associated with increased levels of stress and anxiety during the COVID-19 quarantine. Many active individuals rely on group motivation offered by friends and trainers at the gym to adhere to PA behaviours, including participation in group fitness classes. Lack of socialisation due to imposed stay-at-home restrictions may have demotivated otherwise active, healthy adults. Time is often indicated as a reason why individuals do not engage in regular PA, with participants citing work, commuting, and household responsibilities as tying up one's schedule (Kendzierski & Johnson, 1993). Over half of the working professionals in the present study (56.3%) indicated that the number of days spent on campus decreased, suggesting the elimination of commute time as part of one's workday. However, a reduction in commute time did not lead to higher levels of PA, suggesting that individuals prioritised other activities in this newly found time.

Satisfaction with eating habits also decreased during the COVID-19 quarantine compared to before the quarantine. While there was a decrease in satisfaction in eating habits, participants did not indicate a strong desire to change current eating habits ( $M = 6.33$ ,  $SD = 3.06$ ).

There are also stressors that may have reduced levels of satisfaction with eating habits and led to the adoption of poorer eating behaviours. In response to quarantine-induced increases in stress and anxiety noted by Duncan et al. (2020), individuals may have engaged in eating to soothe stress. This may have included the incorporation of comfort foods containing higher levels of sugar, fat, and/or salt into their eating regimens (Mattioli et al., 2020). A survey conducted by the International Food Information Council indicated that 32% of American adults engaged in more snacking behaviours during COVID-19 than before the pandemic, and 47% of participants indicated increased consumption of sweets (International Food Information Council, 2020). In the present study, despite an indication of reduced satisfaction with eating habits, individuals were not motivated to change current eating habits, suggesting that comfort foods provided benefits beyond one's concern for physical health, such as preservation of mental health.

An important limitation of this study was a lack of distinction in study design between decreased levels of PA and increased SB. Physical activity is defined by whether an individual meets the minimum recommended PA guidelines of 150 minutes of moderate exercise per week. This is different from reducing time spent in SB. An individual may have a desire to reduce his or her SB while still failing to meet the recommended PA guidelines (U.S. HHS, 2018). Future projects could resolve this issue by making the distinction between PA and SB clearer to participants.

Another limitation to this study was the design of survey questions to address behaviours affected by the unprecedented COVID-19 pandemic. With this pilot study, the researcher worked toward validating the questionnaire; future research should include changes to study questions reflecting updated knowledge of COVID-19.

The long-term effects of COVID-19 quarantine restrictions on physical and mental health may not be known for some time. However, the lack of importance placed on prioritising physical health in the short-term suggests the need for behavioural interventions to increase levels of PA and to adopt healthier eating habits. Such interventions are difficult to develop when the reasons behind the lack of motivation to change are unclear. Researchers must also consider whether behaviours adopted during quarantine will reverse after the global crisis subsides, or if these trends will continue to have long-lasting, negative effects on physical health. When prioritising health parameters in the midst of a global pandemic, absent immediate concerns of acute illness, perhaps individuals and societies place greater importance on mental health at the expense of physical health (Cheval et al., 2020; Duncan et al., 2020). As the world's population continues to cope with the myriad negative consequences of the COVID-19 pandemic, health professionals can support individuals and families by encouraging the adoption of healthier behaviours, whether those behaviours impact physical health, mental health, or both. The accompanying infographic includes recommendations for maintaining and improving physical activity and eating habits as the COVID-19 pandemic continues to affect the day-to-day lives of individuals around the world.

## Author biographies

**Merredith Mooth** is a PhD student in Exercise Science in the Department of Health and Human Performance at Middle Tennessee State University.

**Dr Vaughn W. Barry** is currently an Associate Professor in Exercise Science at Middle Tennessee State University. Dr Barry's research focuses on maintaining and improving health by assessing and improving sedentary behaviors and physical activity levels in clinical and healthy adult and older adult populations.

**Sandra Stevens, PhD** is an Associate Professor in the Department of Health and Human Performance at Middle Tennessee State University. She teaches classes in physiology and directs research conducted in the underwater treadmill laboratory. Her research focuses on physical activity training interventions to improve function in individuals with chronic disabilities.

**Jennifer L. Caputo, PhD, CSCS**, is a professor and co-coordinator of Exercise Science at Middle Tennessee State University. She is active in teaching and working with undergraduate and graduate students. Her graduate degrees in Sport Psychology and Exercise Physiology are from the University of North Carolina, Greensboro.

**Dr Smith** is a Registered and Licensed Dietitian/Nutritionist. She is currently an Assistant Professor at Middle Tennessee State University teaching a variety of nutrition courses. Dr Smith's PhD is from Ohio State University and her MS is from Central Michigan, with a BS in Dietetics from Purdue University.

**Dr Bowman** is an applied statistician and psychometrician with expertise in measurement and modeling of social determinants of health. Her primary research foci are assessing the key determinants of health-related quality of life, wellbeing, and access to care in difficult to reach populations.

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