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**An Examination of Sedentary Behavior and  
Stress in Undergraduate Students at  
Western Michigan University**

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## **ACKNOWLEDGEMENTS**

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## Summary

The intention of this research project is to provide a snapshot of current sedentary behavior and stress levels of undergraduate students at Western Michigan University (WMU). This project investigates two variables of interest in current undergraduate students at WMU to understand how much sedentary behavior and stress students are experiencing whilst pursuing their undergraduate degree. Both sedentary behavior and stress are often seen as underlying causes of multiple health issues, which is why they are variables of interest. Understanding these two variables can help the university support aspects of an undergraduate's life affected by increased stress and sedentary behavior while providing a foundation for future research.

The International Physical Activity Questionnaire (IPAQ) and Perceived Stress Scale (PSS) were used to investigate experiences with sedentary behavior and stress levels in undergraduate students. After a four-week recruitment period that offered incentives for participants completing the survey, 380 responses were recorded. Each participant received the same survey, and their responses were kept anonymous. This report contains results from the IPAQ topic areas of transportation, leisure time spent doing moderate to vigorous activity, and leisure time spent sitting on both week and weekend days. From the PSS, a sum of all answered questions was used to derive a stress rating for the undergraduate sample surveyed.

The main questions our research aimed to answer are as follows:

- **How much sedentary behavior are undergraduate students engaging in?**
- **How much perceived stress are undergraduate students experiencing?**
- **How do undergraduate students like to receive health-related information?**

After analyzing descriptive and frequency data, additional questions that we hope to answer in future research are as follows:

- **Do undergraduate students engage in promoted wellness/well-being offerings?**
- **How can we best prepare undergraduate students for the demands of their careers?**
- **And how can we help students develop healthy habits they will carry through life?**

With the data, we will answer the main research questions and provide a foundation for future research intended to help understand how sedentary behavior and stress levels are affecting undergraduate students and their experiences pursuing an academic degree.

## **Purpose and Background Information**

### **I. Defining Sedentary Behavior & WHO Guidelines**

Due to the changing structure of workplaces and effects of the COVID-19 pandemic, there is an increasing need to define sedentary behavior (Bertrand et al., 2021). Therefore, it is important that we continue to research health implications that arise from such behaviors. In this context, sedentary behavior is defined as, "...any waking activities characterized by an energy expenditure  $\leq 1.5$  metabolic equivalents (METs) while in a sitting, lying or reclining posture" (Tremblay et al., 2017, p. 5). To illustrate further, the World Health Organization (WHO) defines sedentary behavior for adults as, "time spent sitting or lying with low energy expenditure, while awake, in the context of occupational, educational, home and community settings, and transportation" (2020, p. 38). In our workplaces and technological activities are making it a norm to be physically inactive as opposed to active.

To understand why increased sedentary behaviors pose a risk, we must investigate the guidelines set forth by the World Health Organization (WHO). In 2020, WHO published a guide around physical and sedentary activity outlining recommended physical activity levels for adults aged 18-64. Adults should aim to engage in about five hours of moderate to vigorous aerobic activity within a week span (WHO, 2020, p. 32). As for sedentary activity, adults should limit their levels of sedentary behavior to increase health benefits and limit health implications (WHO, 2020, p. 38).

### **II. Health Risks of Sedentary Behavior**

As workplaces and leisure activities increase sedentary behaviors, it is crucial to examine the association between sedentary lifestyles and health risks, including the impact of stress. Studies conducted on this phenomenon have indicated the need for continued research that unveils the effect of increased sedentary behavior on one's own health (e.g., Park et al., 2020). What is known is there is a common thread with increased mortality associated with increased sedentary behavior. Park and additional authors mention from their research that due to technological advancements and limited access to spaces to engage in physical activity, sedentary lifestyles are increasing around the world. In their article, they discuss how sedentary lifestyles can affect health in ways such as but not limited to obesity and mental disorders (2020).

The World Health Organization defines obesity as, "...abnormal or excessive fat accumulation that presents a risk to health." In other words, anyone who has a Body Mass Index score over 30 is categorized as obese. There are many reasons individuals are obese (i.e., poor diets, lack of physical activity, genetics), which is why more research is needed to further understand the increase in obesity rates globally. When conducting an evidence-based project, Amos and Fuller created a prevention guide that helps combat the negative effects of poor diets and sedentary lifestyles in college students. From their research, they articulate how 35% of college age students are obese in addition to obesity related health issues are costing the US over \$147 billion (about \$450 per person in the US) annually. A focal point within their research is around inadequate physical activity of college students, which has drastically increased due to the COVID-19 pandemic.

Thus, one factor that could be seen as a confounding variable affecting sedentary behavior is COVID-19 since workplaces and institutions increased remote work and online learning. Additionally, Zieff et al., discuss that “COVID-19 may promulgate harmful cycles in which elevated mental stress exacerbates poor lifestyle behaviors, which, in turn, may lead to even greater stress” (2020, p. 828). In addition, the authors concluded the pandemic has adjusted our behaviors to the point where it has affected our sedentary behavior levels and an increase of mental health implications.

### III. Introducing Undergraduate Students as Interest of Study and Why

The population of interest for this study is undergraduate students at Western Michigan University (WMU). Over the past decade, there have been dozens of studies conducted on the association between undergraduate students and sedentary behavior. As the infrastructure of society in America continues to evolve, researchers Moulin et al (2018) conducted a systematic review to better understand sedentary behavior in undergraduate students. From the authors' combined efforts, they were able to identify 23 studies consisting of undergraduate students and indicate that further research is needed to understand sedentary levels among individuals in pursuing a post-secondary education.

A second reason requiring further inspection on sedentary behavior and undergraduate students is the long-lasting effects of the COVID-19 Pandemic. Within the Saskatchewan and Regina universities in Canada, Bertrand et al (2021) administered an online survey to identify how the dietary, physical activity, and inactivity habits of students have been impacted due to the pandemic. Before the pandemic, undergraduate students were already a vulnerable population to poor eating and exercising habits to begin with. However, results from their survey indicated that negative aspects of dietary intake and sedentary behavior were significantly compounded. Therefore, both the systematic review and study highlight the increasing need to explore the potential impacts of sedentary behavior on undergraduate students.

Furthermore, Rouvinen et al (2021) identified the increasing concern that undergraduate students are at an elevated risk of sedentary behavior and all the health implications due to prolonged physical inactivity from studying and the permeation of video technologies within leisure activities. Thus, studies used in the literature review articulate an increasing need universities' must address; helping students develop a comprehensive approach to improve and maintain their health. For instance, creating an infographic, akin to content developed in Straker's (2016) guidebook around sedentary behavior that should be easy to understand and useful for undergraduate students. Additionally, an infographic can educate students on current sedentary behavior and stress trends in their own student population and incentivize them to seek healthy habits to combat prolonged sedentary behavior through resources provided.

Before we can delve into how to help students, we must understand what sedentary behavior and stress looks like in current undergraduates at WMU. Thus, the main research questions for this study are: **How much sedentary behavior are undergraduate students engaging in? How much perceived stress are undergraduate students experiencing? How do undergraduate students like to receive health-related information?**

Once these initial questions are answered, future research could be done to answer: **How can we best prepare undergraduate students for the demands of their careers? And how can we help students develop healthy habits they will carry through life?**

#### **IV. Understanding Stress Within the Context of Sedentary Behavior**

Stress is a prevalent condition that's association with sedentary behavior has been widely researched. In the context of this study, stress is "A...feeling experienced when a person perceives the demands exceed (their)...resources" (American Institute of Stress). When looking to understand current stress levels of college students, Hoyt et al (2021) provide documentation of perceived stress levels of college students in the United States. What was concluded from their research was the average score of students surveyed were experiencing elevated levels of both stress and anxiety (p. 270). Understanding what sedentary behavior and stress look like in undergraduate students can help provide a foundation for future research to further test the hypothesized association between these sedentary behavior and stress.

#### **V. Overview – Summarizing I-III For Justification of Study and Research Questions**

As our world continues to face advancements in technology and the increasing need to perform sedentary work, we must put our proactive foot forward to understand what stress levels and sedentary behavior in undergraduate students at WMU looks like. Given the potential link between sedentary behavior, stress, and health implications, exploring both sedentary behavior and stress levels can lead to beneficial outcomes that aid in undergraduates' ability to manage stress and sedentary behavior associated with their academic experience. All the quantitative data collected from the surveys will be used to create a deliverable that will be distributed to undergraduate students in Dr. McGrady's class sections for Fall 2022.

### **Procedures**

#### **Subject Recruitment**

The main modes of recruitment were email lists, teachers offering the survey as extra credit, and print communications (i.e., flyers). The recruitment script (see Appendix A) was posted online along with a video reading the script to Holistic Health course sections in the Spring 2022 semester. Following the recruitment script (see Appendix A), students were able to decide whether they would like to participate. The informed consent (see Appendix B) was used electronically and was embedded at the beginning of the survey via Qualtrics.

#### **Survey Design**

The overall survey consisted of 47 questions in total. The questions are split into three categories: sedentary behavior, perceived stress, and demographics. The average time taken to complete the survey by participants was around 10 minutes.

Upon the completion of the survey, students were prompted to fill out a form for entry into a giveaway awarding 10 randomized participants with a \$50 Amazon gift card. To keep survey

responses anonymous and still offer incentives, an external link was given to participants who wanted to be entered in the gift card giveaway.

### **Section I: International Physical Activity Questionnaire (IPAQ)**

The International Physical Activity Questionnaire (See Appendix C) measures moderate and vigorous physical activity behaviors during a week in addition to asking participants how many hours and minutes they engaged in physical activity or sedentary behavior daily. It is appropriate for use with adolescents and adults ages 15-69 and the survey includes 27 questions across five physical activity domains.” The IPAQ directs participants to evaluate their physical activity over the last seven days. Reliability and validity for the IPAQ has been established across 14 sites in 12 countries in the early 2000’s (Booth, 2000). Additionally, the study, ‘International Physical Activity Questionnaire: 12-Country Reliability and Validity’ concluded that the “...IPAQ can be used with confidence in developed countries...” (Craig et al., p. 1389, 2003).

### **Section II: Perceived Stress Scale Short Form (PSS)**

The widely researched Perceived Stress Scale measures the degree to which one views their life as stressful within the last 30 days (Cohen et al, 1983). There are three versions of the PSS: 14 item, 10 item, and 4 item. A review conducted by Lee (2012) examined the reliability and internal consistency of the Perceived Stress Scale, where they concluded the PSS is, “...a short easy to use questionnaire established with acceptable psychometric properties” (p.126). For the purposes of this study, the 10 item PSS was used (see Appendix D).

There are five response categories ranging from “Never” to “Often” on the PSS. A sample question used was, “In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?” Validity and reliability of the PSS 10 item has been established and revisited for this measure given its frequent use (Lee, 2012). As the measure will be used for academic research, no explicit permission is needed from the authors (see <http://www.psy.cmu.edu/~scohen/>).

### **Section III: Demographics**

Questions 37-47 focused on understanding the demographics of our respondents (See Appendix E). From these questions, we were interested to know our participants gender, age, ethnicity, employment status, grade, and overall disposition to how they prefer to receive health-related information. With these questions, it will illuminate the demographic makeup of our participants and shine light on how our sample is dealing with sedentary behavior and stress

#### **Participants**

Demographic questions within our survey were used to identify and understand our participants. It should be noted that responses were not required to continue through the survey.



### What is your gender identity?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	194	51.1	66.2	66.2
	Male	86	22.6	29.4	95.6
	Non-binary / third gender	11	2.9	3.8	99.3
	Prefer not to say	2	.5	.7	100.0
	Total	293	77.1	100.0	
Missing	System	87	22.9		
Total		380	100.0		

When asking for the gender of our respondents, 66.2% participants identified as female (n=194), 29.4% identified as male (n=86), and 3.8% (n=11) identified as nonbinary, and 0.7% (n=2) preferred not to say. What can be learned from this demographic is that our responses came from females, which can explain one of our limitations (e.g., lack of diversity).

N	Valid	293
	Missing	87
Mean		20.8089
Median		20.0000
Std. Deviation		3.00986
Minimum		18.00
Maximum		41.00

When looking at the age range of participants, the sample size age ranged from 18 to 41 years with the mean being 20.8 years. What can be inferred from this demographic is that we are dealing with a younger population, which can influence other factors such as job status and attitudes toward receiving health-related information.

### Choose One of More Races that You Consider Yourself to Be

		White	Black or African American	American Indian or Alaska Native	Asian	Native Hawaiian or Pacific Islander	Hispanic or Latino/a or Other
N	Valid	246	26	5	22	1	20
	Missing	134	354	375	358	379	360

We were also interested in learning our participants' ethnicity to understand our sample of interest. Our largest ethnic group was White undergraduate students (n=246) followed by Black or African American undergraduates (n=26), Asian (n=22), Hispanic or Latino/a or Other (n=20), American Indian or Alaska Native (n=5), and Native Hawaiian or Pacific Islander (n=1). It is important to note students were given the option to select multiple races they considered

themselves to be. Thus, even though our sample is heavily skewed toward white undergraduate students there could be students who selected white and other ethnicities.

### What year are you in for your undergraduate degree?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Junior	93	24.5	31.7	31.7
	Freshman	72	18.9	24.6	56.3
	Sophomore	62	16.3	21.2	77.5
	Senior	46	12.1	15.7	93.2
	Super Senior (5+ Years)	20	5.3	6.8	100.0
	Total	293	77.1	100.0	
Missing	System	87	22.9		
Total		380	100.0		

Participants' demographic that was least skewed was their undergraduate class ranks. However, undergraduate Juniors were the highest class in our sample at 31.7% (n=93) followed by Freshmen at 24.6% (n=72), Sophomores at 21.2% (n=62), Seniors at 15.7% (n=46), and Super Seniors at 6.8% (n=20).

### What is your employment status?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Part-time	169	44.5	57.5	57.5
	Unemployed	89	23.4	30.3	87.8
	Full-time	24	6.3	8.2	95.9
	Contract/Temporary	9	2.4	3.1	99.0
	Unable to work	3	.8	1.0	100.0
	Total	294	77.4	100.0	
Missing	System	86	22.6		
Total		380	100.0		

Another significant demographic recorded was Participants' employment statuses. What can be learned is that undergraduates have diversified employment statuses, but the largest employment status was part-time work at 57.5% (n=169) followed by unemployed at 30.3% (n=89), full-time work at 8.2% (n=24), Contract/Temporary at 3.1% (n=9), and unable to work at 1% (n=3). This helps us understand what students may be engaged in when not pursuing their academic degree. However, to derive more enriching data from this statistic, types of occupations should be investigated when conducting future research.

### Are you interested and/or seeking a health-related major and/or minor?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	191	50.3	65.0	65.0
	Yes	103	27.1	35.0	100.0
	Total	294	77.4	100.0	
Missing	System	86	22.6		
Total		380	100.0		

The last significant demographic was recommended by committee member, Dr. Robert Bensley, and it was around asking participants if they were interested in, or are currently seeking, a health-related major or minor. What is learned from this statistic is that 65% of our participants are not currently seeking a health-related degree (n=191) whereas 35% of our participants are currently seeking a health-related degree (n=103). Depending on whether participants answered yes or no, they were then prompted to select the college housing their degree. In total, the College of Arts and Sciences was the largest college at WMU represented in our sample as 31.2% of participants had degrees located there (n=92).

## Findings and Discussion

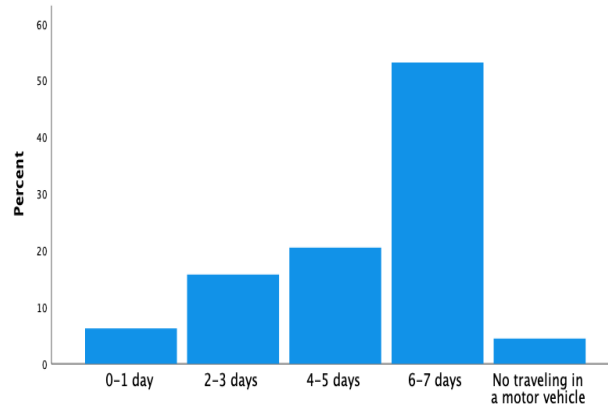
### Section I: Sedentary Behavior

This section discusses five key findings within the International Physical Activity Questionnaire (IPAQ). The five key findings within undergraduates' sedentary behavior within transportation, leisure time spent doing moderate to vigorous activity, and leisure time spent sitting on both week, and weekend, days.

#### During the last 7 days, on how many days did you travel in a motor vehicle like a train, bus, car, or tram?

	N	%
0-1 day	21	5.5%
2-3 days	53	13.9%
4-5 days	69	18.2%
6-7 days	179	47.1%
No traveling in a motor vehicle	15	3.9%
Missing System	43	11.3%

During the last 7 days, on how many days did you travel in a motor vehicle like a train, bus, car, or tram?



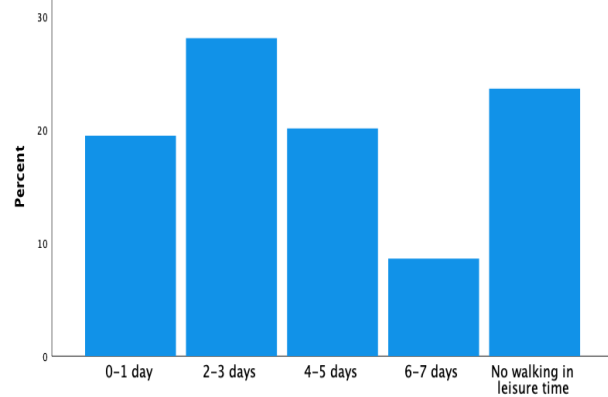
In part two of the IPAQ, transportation related activity is assessed. A question that harbors significant insights into the undergraduate sample's activity, or inactivity, is based on the use of a motor vehicle for transportation. At a week's glance, we learned that 47.1% of participants use a motor vehicle for transportation 6-7 days in a week (n=179). Knowing this statistic illuminates the idea sedentary behavior within our undergraduate sample is affected by modes of motorized

transportation. What can be learned in future research is the average time undergraduates use motorized transportation in a week.

**Not counting any walking you have already mentioned, during the last 7 days, on how many days did you walk for at least 10 minutes at a time in your leisure time?**

	N	%
0-1 day	61	16.1%
2-3 days	88	23.2%
4-5 days	63	16.6%
6-7 days	27	7.1%
No walking in leisure time	74	19.5%
Missing System	67	17.6%

Not counting any walking you have already mentioned, during the last 7 days, on how many days did you walk for at least 10 minutes at a time in your leisure time?

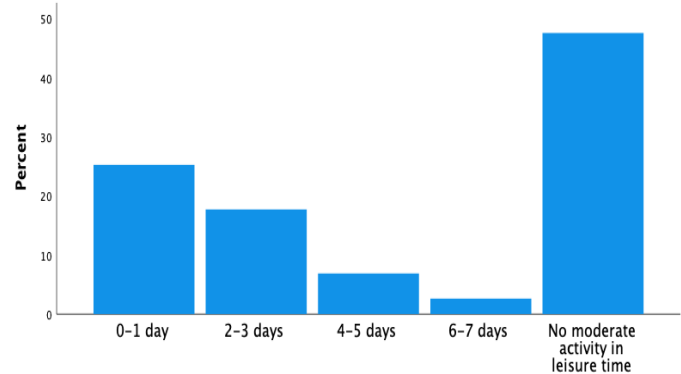


In part four of the IPAQ, recreation, sport, and leisure time in our participants are assessed. Data collected within this section has revealed three key insights into sedentary behavior in current undergraduates. The first key insight revealed that during a one-week span, 19.5% of participants shared they spend no time up to three days per week engaging in leisure time walking (n=74). In short, participants tend to engage in walking in their leisure time.

**Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, how many days did you do moderate physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis in your leisure time?**

	N	%
0-1 day	77	20.3%
2-3 days	54	14.2%
4-5 days	21	5.5%
6-7 days	8	2.1%
No moderate activity in leisure time	145	38.2%
Missing System	75	19.7%

Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, how many days did you do moderate physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis in your leisure time?

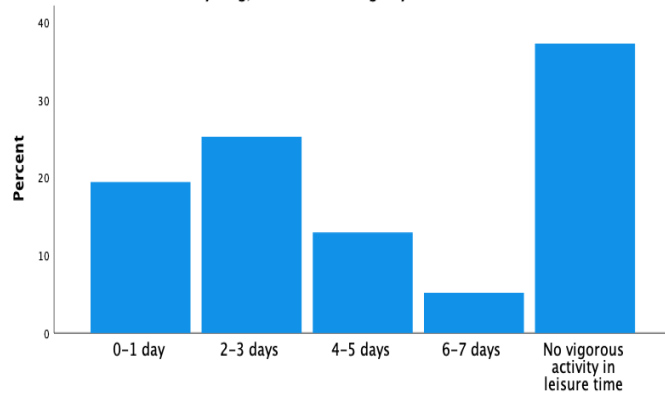


The second key insight gained from section four is around moderate activity within undergraduates' leisure time. Approximately 38.2% of participants answered that they engage in no moderate activity in leisure time in a week (n=145). It could be hypothesized students who engage in little to no moderate activity in other areas of their life are at risk of not meeting the general physical activity guidelines for moderate activity on a weekly basis (WHO, 2020, p. 32).

**Think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do vigorous physical activities like aerobics, running, fast bicycling, or fast swimming in your leisure time?**

Think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do vigorous physical activities like aerobics, running, fast bicycling, or fast swimming in your leisure time?

	N	%
0-1 day	60	15.8%
2-3 days	78	20.5%
4-5 days	40	10.5%
6-7 days	16	4.2%
No vigorous activity in leisure time	115	30.3%
Missing System	71	18.7%



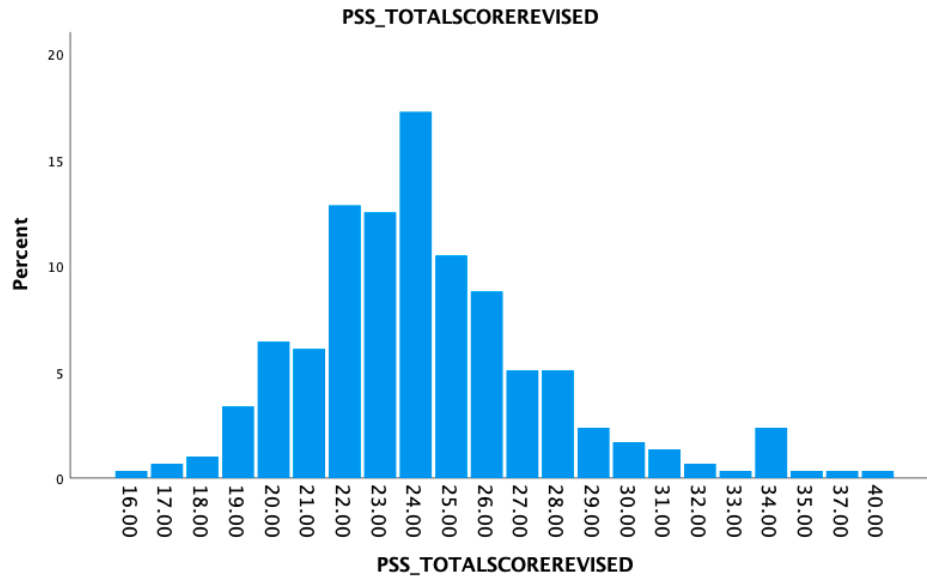
The third key insight gained from section four is around vigorous activity within undergraduates' leisure time. Approximately 30.3% of participants answered that they engage in no vigorous activity in a week (n=115). Knowing over 30% of our sample does not engage in either moderate or vigorous physical activity during their leisure time may result in a greater likelihood that undergraduates at Western Michigan University are not meeting the general physical activity guidelines for moderate and vigorous activity on a weekly basis (WHO, 2020, p. 32).

### Time Spent Sitting in the Last 7 Days

		Sitting on a Weekday - Hours	Sitting on a Weekend Day - Hours
N	Valid	283	271
	Missing	97	109
Mean		11.0707	9.5609
Std. Deviation		9.97987	7.99878

The last crucial insight from the IPAQ comes from section five; time spent sitting. The participants of our survey were asked about time spent engaging in sedentary behavior (i.e., sitting) and during a weekday, the mean for time spent sitting on a weekday was 11.07 hours and a mean of 9.5 hours on a weekend day. It should be noted that the standard deviation was high for both a weekday (SD=9.98) and a weekend day (SD=8) which means that is a significant dispersion among answers. Nevertheless, the means indicate that the participants surveyed do engage in more sedentary behavior than is recommended by the World Health Organization (WHO, 2020, p. 38).

## Section II: Perceived Stress



The results from the Perceived Stress Scale in our study indicate our undergraduate student sample are moderately stressed (Mean=24.3, Median=24, SD=3.53, N=295). These findings echo the yearly national findings by the American College Health Association. According to ACHA, in their 2021 NCHA study that investigated impediments to academic performance noted 38.5% of 33,2204 students surveyed across 41 institutions felt that stress negatively impacted their academic performance. When looking at students who answered stress as the only impediment, the percentage increased to 53.7% (American College Health Association, p. 6, 2022).

It should be noted that symptoms of stress can exacerbate into chronic conditions (e.g., anxiety, depression, insomnia, and posttraumatic/acute stress disorder) that influence students perceived self-efficacy and sedentary behavior. With the PSS results, it is revealed that the sample surveyed is experiencing moderate stress. Further research is needed to identify the root-cause of stress in academia to remediate the mental and physical outcomes of stress.

### Section III: Health-related information

Understanding preferences toward receiving health-related information is crucial for creating useful content for students. For undergraduates who participated in the survey were asked to rank methods of receiving information (e.g., in-person events, digital materials, print materials, and virtual events) on a Likert-style scale ranging from “Very Useful” to “Not Useful at All.” In the sections below, key findings of student preferences toward receiving health-related information are discussed.

### In-Person Events

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Useful	90	23.7	31.4	31.4
	Moderately Useful	76	20.0	26.5	57.8
	Slightly Useful	49	12.9	17.1	74.9
	Extremely Useful	37	9.7	12.9	87.8
	Not Useful at All	35	9.2	12.2	100.0
	Total	287	75.5	100.0	
Missing	System	93	24.5		
Total		380	100.0		

From our sample, 44.3% undergraduates found in-person events very useful to extremely useful (n=127). This could be due to an increased desire within the undergraduate population to be back on campus and interact face-to-face with others.

### Digital Materials (e.g., e-book, online eLearning module)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Moderately Useful	105	27.6	36.6	36.6
	Very Useful	79	20.8	27.5	64.1
	Slightly Useful	54	14.2	18.8	82.9
	Extremely Useful	29	7.6	10.1	93.0
	Not Useful at All	20	5.3	7.0	100.0
	Total	287	75.5	100.0	
Missing	System	93	24.5		
Total		380	100.0		

When asked preferences toward digital materials, 37.6% undergraduates found digital materials very useful to extremely useful (n=108). This could translate into the idea that students value in-person interaction, but they also prefer resources that can be found online.

### Virtual Events

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Moderately Useful	87	22.9	30.5	30.5
	Slightly Useful	81	21.3	28.4	58.9
	Not Useful at All	60	15.8	21.1	80.0
	Very Useful	42	11.1	14.7	94.7
	Extremely Useful	15	3.9	5.3	100.0
	Total	285	75.0	100.0	
Missing	System	95	25.0		
Total		380	100.0		

The last key finding discovered from asking undergraduate preferences toward receiving health-related information was that only 20% of participants viewed virtual events as very useful to extremely useful (n=57). As universities continue to face effects of the pandemic, undergraduate experiences have evolved to increase attitudes toward online learning.

**Print Materials (e.g., flyers, brochure, booklets)**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Slightly Useful	99	26.1	34.7	34.7
	Moderately Useful	85	22.4	29.8	64.6
	Not Useful at All	55	14.5	19.3	83.9
	Very Useful	32	8.4	11.2	95.1
	Extremely Useful	14	3.7	4.9	100.0
	Total	285	75.0	100.0	
Missing	System	95	25.0		
Total		380	100.0		

As students continued to share preferences toward receiving health-related information, 16.1% of undergraduates surveyed found print materials very useful to extremely useful (n=46). Print materials may have received a lower preference due to the permeation of technology in our everyday lives in addition to the increase in online learning and online materials.

**Limitations of Study**

Looking back there are a few limitations in this research study. First, time was a big limitation when it came to analyzing the data to expand on our findings. Thus, studies on this topic should be given a longer period to investigate the data collected. Second, our sample was heavily skewed toward white females, which illuminates our study’s limited ethnic and gender diversity. In future research, there should be steps taken toward targeted recruitment efforts to provide snapshot of the true ethnic representation within the undergraduate population at WMU.

Third, our survey asked specific questions pertaining to stress and sedentary behavior which made it hard to see a broad scope of health and wellness within the undergraduate population at WMU. Future research conducted on this topic should find ways to ask more general health and wellness questions to garner more insights into undergraduates’ experiences with stress and sedentary behavior. Finally, the measure we used to collect sedentary behavior data was in a format that may have been hard for students to understand when self-reporting data. In the future, providing clear and concise questionnaires for undergraduates’ self-reporting their own data will aid in mitigating response errors.

**Implications of Future Research**

This research project has the capability to be expanded in a variety of ways. First, the research questions could be broadened in a way to explore the relationships between stress and sedentary behavior using the data collected. Second, the intent of this project was to provide a snapshot of sedentary behavior and stress in undergraduate students, future research could build off the pre-



existing data to conduct a needs assessment and develop training modules that support students developing healthy habits that they will carry through their life. Lastly, the IPAQ questionnaire results can be examined further to create tailored training programs for undergraduates at WMU

### Conclusion

By assessing current sedentary behavior and stress levels in undergraduate students at WMU, this study provides a snapshot of 380 undergraduates' experiences with both sedentary behavior and stress. Using a quantitative survey containing the International Physical Activity Questionnaire (IPAQ), the Perceived Stress Scale (PSS), and demographic questions, experiences around sedentary behaviors, stress, and preference toward receiving health-related information were identified and investigated in a sample of undergraduate students at WMU. Upon analyzing the research data, key findings that answer the initial research questions are discussed.

The first question posed in our research was around understanding how much sedentary behavior undergraduates are engaging in. The IPAQ unveiled five key insights that answered this question. First, we learned that 47.1% of our participants use motorized transportation between six to seven days a week. Knowing our population heavily relies on motorized transportation means that they are susceptible to increased sedentary behavior. Second, when asked about how much time participants engaged in walking during their leisure time, 58.8% of participants selected that they spend no leisure time walking for up to three days in a week. The third and fourth findings from the IPAQ revolved around students' moderate and vigorous activity during leisure time, which showed, respectively, that 38.2% and 30.3% of participants engage in no moderate to vigorous activity during leisure time. It could be hypothesized students who engage in little to no moderate activity in other areas of their life are at risk of not meeting the general physical activity guidelines for moderate activity on a weekly basis (WHO, 2020, p. 32). The last significant statistic to share from the IPAQ was that the sample surveyed spent an average of 11.07 hours on a weekday and 9.5 hours on a weekend day sitting. Though our standard deviation was high for both responses, these results may indicate the sample surveyed engages in more sedentary behavior than is recommended by the World Health Organization (WHO, 2020, p. 38).

The second research question in this study was to understand how much perceived stress students are experiencing. Using the Perceived Stress Scale, it was discovered undergraduate students at Western Michigan University are moderately stressed (Mean=24.3, SD=3.53, N=295). Knowing that our sample's responses echo statistics in the NCHA-AHCA Fall 2021 study, the university should continue to find ways to mitigate undergraduates' perceived stress and conduct a root-cause analysis of stressors.

The goal of our third research question was to understand undergraduate preferences toward receiving health-related information. Undergraduates were asked about preferences toward digital materials, print materials, virtual events, and in-person events. From our sample, it was found 44.3% of undergraduates find in-person events very useful to extremely useful, 37.6% undergraduates find digital materials very useful to extremely useful, 20% undergraduates find

virtual events very useful to extremely useful, and 16.1% of undergraduates find print materials very useful to extremely useful.

Overall, this study has built a foundation for future research questions around how to best support undergraduate students affected by sedentary behavior and stress.

## **Appendix A: Recruitment Script**

Hello my name is Samantha Putman and I am a Senior at Western Michigan University. For my Lee Honors College thesis project, I am collecting data on sedentary behavior and stress levels of undergraduate students at Western Michigan University (WMU) under the guidance of Dr. Michele McGrady. I invite you to participate as you are currently an undergraduate student at WMU.

Participation in this research includes answering a series of questions at the beginning of the Spring 2022 semester. Should you decide to participate, your total time commitment will be approximately 15 minutes total during one session.

Potential benefits for your participation include a chance at winning a \$50 gift card (10 random participants will be selected to receive the gift card upon the completion of the survey), a deliverable (e.g., booklet, module, or presentation) for undergraduate students at the end of Spring 2022, and your participation will serve as evidence of the performance of WMU's wellness initiatives.

If you choose to participate, please know that you can withdraw from the study at any time without penalty.

By clicking on the survey link provided, you will be directed to the consent document that will reiterate the intention of the survey and upon agreeing to the terms, you will be prompted to fill out two brief questionnaires about sedentary behavior and stress levels.

## Appendix B: Consent Form

Western Michigan University  
Integrative Holistic Health and Wellness

**Principal Investigator:** Dr. Michele McGrady

**Student Investigator:** Samantha Putman

You are invited to participate in this research project titled "*Examination of Sedentary Behavior and Stress Levels in Undergraduate Students at Western Michigan University*"

**STUDY SUMMARY:** This consent form is part of an informed consent process for a research study, and it will provide information that will help you decide whether you want to take part in this study. Participation in this study is completely voluntary. The purpose of the research is to: examine current sedentary behavior and stress levels of undergraduate students at Western Michigan University (WMU) and will serve as Samantha's undergraduate thesis for the requirements of the Bachelor of Arts, Strategic Communication: Diversity & Inclusion.

If you take part in the research, you will be asked to complete two brief questionnaires. Your replies will be completely anonymous, so do not put your name anywhere on the survey. Your time in the study will take 15 minutes to complete the survey. The risks and costs to you for taking part in the study may be potential discomfort from answering sensitive questions.

The benefits to your participation include a chance at winning a \$50 gift card (10 random participants will be selected to receive the gift card upon the completion of the survey) and a deliverable (e.g., booklet, module, or presentation) for undergraduate students at the end of Spring 2022.

The de-identified (anonymous) information collected for this research may be used by or distributed to investigators for other research without obtaining informed consent from you. Your alternative to taking part in the research study is not to take part in it.

Should you have any questions prior to or during the study, you can contact Dr. Michele McGrady at 269-387-3556 or [Michele.L.McGrady@wmich.edu](mailto:Michele.L.McGrady@wmich.edu) or Samantha Putman at 269-986-3198 or [Samantha.L.Putman@wmich.edu](mailto:Samantha.L.Putman@wmich.edu). You may also contact the Chair, Institutional Review Board at 269-387-8293 or the Vice President for Research at 269-387-8298.

This consent has been approved by the Western Michigan University Institutional Review Board (WMU IRB) on December 7, 2021.

Participating in this survey online indicates your consent for use of the answers you supply.

Add buttons to click:

I agree to participate in this research study (Survey following upon clicking)

I do not agree to participate in this research study (Browser closes)

## **Appendix C: International Physical Activity Questionnaire (IPAQ)**

The International Physical Activity Questionnaires (IPAQ) comprises a set of 4 questionnaires. Long (5 activity domains asked independently) and short (4 generic items) versions for use by either telephone or self-administered methods are available. The purpose of the questionnaires is to provide common instruments that can be used to obtain internationally comparable data on health-related physical activity.

**INSTRUCTIONS:** We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the last 7 days. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise, or sport. Think about all the vigorous and moderate activities that you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Moderate activities refer to activities that take moderate physical effort and make you breathe harder than normal.

### **PART ONE: JOB – RELATED PHYSICAL ACTIVITY**

The first section is about your work. This includes paid jobs, farming, volunteer work, course work, and any other unpaid work that you did outside your home. Do not include unpaid work you might do around your home, like housework, yard work, general maintenance, and caring for your family. These are asked in Part 3.

#### **1. Do you currently have a job or do any unpaid work outside your home?**

Yes                       No –*Skip to PART 2*

The next questions are about all the physical activity you did in the last 7 days as part of your paid or unpaid work. This does not include travelling to and from work.

#### **1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, heavy construction, or climbing upstairs as part of your work?**

**Think about only those physical activities that you did for at least 10 minutes at a time.**

days per week                       No vigorous job-related physical activity –*Skip to question 4*

#### **2. How much time did you usually spend on one of those days doing vigorous physical activities as part of your work?**

hours per day                       minutes per day

#### **4. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like carrying light loads as part of your work? Please do not include walking.**

days per week                       No moderate job-related physical activity –*Skip to question 6*

**5. How much time did you usually spend on one of those days doing moderate physical activities as part of your work?**

\_\_\_\_\_ hours per day      \_\_\_\_\_ minutes per day

**6. During the last 7 days, how many days did you walk for at least 10 minutes at a time as part of your work? Please do not count any walking you did to travel to or from work.**

\_\_\_\_\_ days per week      \_\_\_\_\_ No job-related walking –Skip to *PART 2*

**7. How much time did you usually spend on one of those days walking as part of your work?**

\_\_\_\_\_ hours per day      \_\_\_\_\_ minutes per day

## **PART 2: TRANSPORTATION PHYSICAL ACTIVITY**

These questions are about how you traveled from place to place, including to places like work, stores, movies, and so on.

**8. During the last 7 days, how many days did you travel in a motor vehicle like a train, bus, car, or tram?**

\_\_\_\_\_ days per week      \_\_\_\_\_ No traveling in a motor vehicle –Skip to question 10

**9. How much time did you usually spend on one of those days traveling in a train, bus, car, tram, or other kind of motor vehicle?**

\_\_\_\_\_ hours per day      \_\_\_\_\_ minutes per day

Now think only about the bicycling and walking you might have done to travel to and from work, to do errands, or to go from place to place.

**10. During the last 7 days, how many days did you bicycle for at least 10 minutes at a time to go from place to place?**

\_\_\_\_\_ days per week      \_\_\_\_\_ No bicycling from place to place –Skip to question 12

**11. How much time did you usually spend on one of those days cycling from place to place?**

\_\_\_\_\_ hours per day      \_\_\_\_\_ minutes per day

**12. During the last 7 days, on how many days did you walk for at least 10 minutes at a time to go from place to place?**

\_\_\_\_\_ days per week      \_\_\_\_\_ No walking from place to place –Skip to **PART 3**

**13. How much time did you usually spend on one of those days walking from place to place?**

\_\_\_\_\_ hours per day      \_\_\_\_\_ minutes per day

## **PART 3: HOUSEWORK, HOUSE MAINTENANCE, AND CARING FOR FAMILY**

This section is about some of the physical activities you might have done in the last 7 days in and around your home, like housework, gardening, yard work, general maintenance work, and caring for your family.

**14. Think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, how many days did you do vigorous physical activities like heavy lifting, chopping wood, shoveling snow, or digging in the garden or yard?**

\_\_\_\_\_ days per week No vigorous activity in garden or yard Skip to question 16

**15. How much time did you usually spend on one of those days doing vigorous physical activities in the garden or yard?**

\_\_\_\_\_ hours per day \_\_\_\_\_ minutes per day

**16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate activities like carrying light loads, sweeping, washing windows, and raking in the garden or yard?**

\_\_\_\_\_ days per week No moderate activity in garden or yard Skip to question 18

**17. How much time did you usually spend on one of those days doing moderate physical activities in the garden or yard?**

\_\_\_\_\_ hours per day \_\_\_\_\_ minutes per day

**18. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, how many days did you do moderate activities like carrying light loads, washing windows, scrubbing floors, and sweeping inside your home?**

\_\_\_\_\_ days per week No moderate activity inside home Skip to PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY

**19. How much time did you usually spend on one of those days doing moderate physical activities inside your home?**

\_\_\_\_\_ hours per day \_\_\_\_\_ minutes per day

#### **PART 4: RECREATION, SPORT, AND LEISURE-TIME PHYSICAL ACTIVITY**

This section is about all the physical activities that you did in the last 7 days solely for recreation, sport, exercise, or leisure. Please do not include any activities you have already mentioned.

**20. Not counting any walking you have already mentioned, during the last 7 days, on how many days did you walk for at least 10 minutes at a time in your leisure time?**

\_\_\_\_\_ days per week No walking in leisure time –Skip to question 22

**21. How much time did you usually spend on one of those days walking in your leisure time?**

\_\_\_\_\_ hours per day \_\_\_\_\_ minutes per day

**22. Think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do vigorous physical activities like aerobics, running, fast bicycling, or fast swimming in your leisure time?**

\_\_\_\_\_ days per week \_\_\_\_\_ No vigorous activity in leisure time –Skip to question 24

**23. How much time did you usually spend on one of those days doing vigorous physical activities in your leisure time?**

\_\_\_\_\_ hours per day \_\_\_\_\_ minutes per day

**24. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, how many days did you do moderate physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis in your leisure time?**

\_\_\_\_\_ days per week \_\_\_\_\_ No moderate activity in leisure time –Skip to PART 5

**25. How much time did you usually spend on one of those days doing moderate physical activities in your leisure time?**

\_\_\_\_\_ hours per day \_\_\_\_\_ minutes per day

### **PART 5: TIME SPENT SITTING**

The last section contains questions about the time spent sitting while at work, at home, while doing course work and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television. Do not include any time spent sitting in a motor vehicle that you have already told me about.

**26. During the last 7 days, how much time did you usually spend sitting on a weekday?**

\_\_\_\_\_ hours per day \_\_\_\_\_ minutes per day

**27. During the last 7 days, how much time did you usually spend sitting on a weekend day?**

\_\_\_\_\_ hours per day \_\_\_\_\_ minutes per day

### **Appendix D: Perceived Stress Scale**

A more precise measure of personal stress can be determined by using a variety of instruments that have been designed to help measure individual stress levels. The first of these is called the Perceived Stress Scale. The Perceived Stress Scale (PSS) is a classic stress assessment instrument. The tool, originally developed in 1983, remains a popular choice for helping us understand how different situations affect our feelings and our perceived stress. The questions in this scale ask about your feelings and thoughts during the last month.

**INSTRUCTIONS:** In each case, you will be asked to indicate how often you felt or thought a certain way. Although some of the questions are similar, there are differences between them, and



you should treat each one as a separate question. The best approach is to answer quickly. That is, do not try to count the number of times you felt a particular way; =indicate the alternative that seems like a reasonable estimate.

**0 - never 1 - almost never 2 - sometimes 3 - often 4 - very often**

1. In the last month, how often have you been upset because of something that happened unexpectedly? \_\_\_\_\_
2. In the last month, how often have you felt that you were unable to control the important things in your life? \_\_\_\_\_
3. In the last month, how often have you felt nervous and stressed? \_\_\_\_\_
4. In the last month, how often have you felt confident about your ability to handle your personal problems? \_\_\_\_\_
5. In the last month, how often have you felt that things were going your way? \_\_\_\_\_
6. In the last month, how often have you found that you could not cope with all the things that you had to do? \_\_\_\_\_
7. In the last month, how often have you been able to control irritations in your life? \_\_\_\_\_
8. In the last month, how often have you felt that you were on top of things? \_\_\_\_\_
9. In the last month, how often have you been angered because of things that happened that were outside of your control? \_\_\_\_\_
10. In the last month, how often have you felt difficulties piling up so high that you could not overcome them? \_\_\_\_\_

### **Appendix E: Demographic Questions**

Q1. What is your gender?

- Male
- Female
- Nonbinary / third gender
- Prefer not to say

Q2. What is your age? 18-65

- Sliding Bar <----->

Q3. Choose one or more races that you consider yourself to be:

- White
- Black or African American
- American Indian or Alaska Native
- Native Hawaiian or Pacific Islander

- Other

Q4. Which Country Do You Reside In?

Q5. Which state do you reside in?

Q6. What is your employment status?

- Full-time
- Part-time
- Contract/ Temporary
- Unemployed
- Unable to work

Q7. What Grade Are You in for Your Undergraduate Degree?

- Freshman
- Sophomore
- Junior
- Senior

Q8. Are You Interested and/or Seeking a Health-Related Major and/or Minor?

- Yes (Display Logic) 9A
- No (Display Logic) 9B

Q9A. Which College Does Your Health-Related Major and/or Minor Fall Under?

- College of Health and Human Services
- College of Education and Human Development
- College of Arts and Sciences
- Other: \_\_\_\_\_

Q9B. Which College Does Your Non-Health-Related Degree(s) Fall Under?

- College of Aviation
- Haworth College of Business
- College of Engineering and Applied Sciences
- Other: \_\_\_\_\_

Q10. How Would You Prefer to Learn About Ways to Improve Your Health? Likert-style scale ranging from “Very Useful” to “Not Useful at All”

- In-Person Events
- Digital Materials
- Print Materials
- Virtual Events
-

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