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Motivators and Barriers Affecting Physical Activity Participation in Online Graduate Students

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Walden University
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Abstract

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MS, Wright State University, 2005

BA, East Tennessee State University, 1997

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

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Abstract

Physical inactivity is a major contributor to chronic diseases, especially coronary heart disease. The American College Health Association's National College Health Assessment II showed that only 47.4% of college students are meeting suggested physical activity requirements. As the nontraditional student population increases, research is needed to identify motivators and barriers specifically for online graduate students. The purpose of this case study was to examine the relationships of barriers and motivators for physical activity in online graduate students at an online university. The study addressed research questions on what physical activity barriers existed in this study sample, (b) what intrinsic motivators and extrinsic motivators towards physical activity existed in the study sample, and (c) what difficulties were present in collecting data from online students. The study was based on the self determination theory (SDT), used to understand the motivation of health behaviors. The Exercise Motivations Inventory-2 instrument was used to understand intrinsic and extrinsic motivators to exercise. The research design was an in-depth illustrative case study of 13 online university graduate students. Questionnaires were posted through an online participant pool. The frequencies were tabulated to show that physical barriers were not perceived by most to interfere with physical activity, intrinsic motivators most valued were enjoyment, ill-health avoidance, and stress management, and extrinsic most valued were appearance and weight management. Understanding the motivators and barriers among online students can initiate a positive social change to create more effective programs and opportunities to increase activity rates among online graduate students.

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Dedication

I would like to dedicate this dissertation to my loving family, my husband Nick and my son Alec, who gave me moral support throughout the process. I would also like to dedicate my dissertation to my deceased grandparents, Jim and Jean, who encouraged me to accomplish all that I can throughout my life. Their support helped drive this accomplishment. I would also like to dedicate this dissertation to my parents, Laura and Charles, who have offered their support throughout.

Acknowledgments

I would like to acknowledge all of those who have helped me undertake this project. My committee chair, Manoj Sharma, encouraged me throughout the research and writing process. Dr. Heidi Marshall (my writing instructor) was very supportive throughout her writing course, and the experience really changed and made a positive impact on my writing. I would also like to thank Mr. Markland for allowing me to use the EMI-2 instrument. The EMI-2 is based on self determination theory, the framework of this study. I am proud to have used this instrument on a population that it has not been used on. I would like to thank God for his strength and guidance in this endeavor.

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Chapter 1: Introduction to the Study

Introduction

Chronic diseases, especially coronary heart disease, is a major concern among health care professionals, especially in the United States, and physical activity has been known to reduce the risk of such diseases. Physical activity can have multiple benefits, not only reducing coronary heart disease but also being correlated with a reduction in depression, reducing the risk of developing Type II diabetes, and reducing the risk of some cancers (Penglee, Christiana, Battista, & Rosenberg, 2019). One of the results of a sedentary lifestyle is the increase in technological advances. Adults in the United States have been reported to spend approximately 11 to 12 hours during the day being sedentary, and this may have major impacts on coronary disease (Diaz et al, 2019). High levels of moderate and vigorous activity may help to eliminate this increased risk (Diaz et al., 2019). Penglee et al. (2019) conducted a study on smartphone use and physical activity in college students in the United States and Thailand. They found that increased use of smartphones was correlated with a decrease in activity in students from Thailand (Penglee et al., 2019). Students from the United States had more days of physical activity, but those students also had a higher body mass index than the Thai students (Penglee et al., 2019). The American College Health Association's National College Health Assessment II (ACHA-NCHA II) survey revealed that only 47.4% of the college student populations were meeting physical activity requirements (Kulavic, Hultquist, & McLester, 2013). Physical inactivity can be a contributor to chronic disease in the future,

mental disease in the present, and other physical disorders in college students (Penglee et al., 2019). Thus, increasing exercise must be a priority.

The college population is an effective target population in which to intervene in the disease process by using educational programs and providing exercise facilities or alternate opportunities to be active. Students growing into adulthood will undergo many changes, and there are many sedentary aspects of college, such as sitting in classes and completing homework (Diehl, Fuchs, Rathmann, & Hilger-Kolb, 2018). Interventions at this stage encourage a long-term change in behavior. Providing resources for all college student populations has become challenging as the number of online college students, the focus of this study, has increased (see Kulavic et al., 2013). Online students do not have the same physical education opportunities and exercise facilities as traditional college students. Therefore, physical activity programs and opportunities for the online student population need to be developed (Kulavic et al., 2013). Online college students often lack access to a fitness facility, intramural sports, or educational classes on physical activity. In addition, online students or nontraditional students may have added responsibilities, such as having a full-time job or caring for children, as well as being older than the typical college student, all of which can act as barriers to exercise (Kulavic et al., 2013). In a traditional college setting, students have changing circumstances. These changes may create barriers and motivators for physical activity. Traditional university sports programs may be offered, and qualitative findings from a mixed method study showed that students found these activities to reduce stress and take their mind off their problems (Diehl et al., 2018). In this study, I aimed to gain a better understanding of online

graduate students' motivators and barriers to physical activity. With this knowledge, future health promotion programs can be developed to promote an increase in activity among this population, which can provide a better quality of life. In order to accomplish these goals for the online student population, partnerships should be formed with physical fitness facilities and organizations providing online support through educational programs.

Background

A case study from Turkey emphasized the growing concern for obesity rates in childhood and adulthood in developing countries as well as around the globe (Steenson et al., 2018). Childhood obesity has been correlated with an increased risk in chronic diseases throughout adulthood (Steensen, et al., 2018). Parents in Steenson et al.'s (2018) study reported these top barriers to physical activity: lack of free time, work, being tired, family, access, safety, and pollution. Online graduate students in my institutional review board (IRB) approved study were nontraditional, and they had many of the responsibilities as the parents Steenson et al.'s case study. Meeting recommended guidelines for physical activity may be challenging, and in this study, I explored the motivators and possible barriers found in an online university population of graduate students.

Guidelines for activity in adults are a minimum of 150 and up to 300 minutes of moderate cardiovascular activity per week (Office of Disease Prevention and Health Promotion, 2018). Alternatively, 75 to 150 minutes of vigorous cardiovascular activity could be performed per week for benefits (Office of Disease Prevention and Health

Promotion, 2018). In addition to cardiovascular activity, two or more strength training sessions are to be performed each week (Office of Disease Prevention and Health Promotion, 2018). Additional benefits can be gained by surpassing the 300 minutes of moderate activity (Office of Disease Prevention and Health Promotion, 2018).

Many university students suffer from physical inactivity due to class activities, which creates a need for advanced intervention programs during this stage of life (Diehl et al., 2018). The Centers for Disease Control and Prevention (CDC) uses the Behavioral Risk Factor Surveillance System to assess various health behaviors in the United States. According to the 2013 Behavioral Risk Factor Surveillance System, 79.5% of the population surveyed ages 18 and above did not participate in the required guidelines for aerobic and muscle strengthening activities (CDC, 2015). Physical activity practices among traditional college students have been the focus in multiple studies to investigate reasons for the decline during college years. For example, in the American College Health Association National College Health Assessment II, only 47.4% of college students, traditional and nontraditional, reported that they are meeting physical activity guidelines (as cited in Kulavic et al., 2013). Prevention programs targeted towards nontraditional college students in an online setting could avert this decline in physical activity.

The population of college students has been transformed with the increase in the number of nontraditional students returning to college in online programs (Kulavic et al., 2013). Nontraditional students include online learners' ranging in age from 22 to 55+

(Van Doorn & Van Doorn, 2014). The nontraditional student typically works full-time and assumes family responsibilities (Van Doorn & Van Doorn, 2014).

The online adult learners who succeed in their academic programs have been shown to possess multiple intrinsic motivators. These include a high locus of control and a positive attitude toward their instructors and classrooms (Dabbagh, 2007). Previous researchers suggested that physical activity among online learners could also be intrinsically motivated (Dabbagh, 2007).

In this case study, I explored the intrinsic motivators, the extrinsic motivators, the barriers for physical activity in online graduate students, and the difficulties in collecting data from online graduate students. The original IRB approved study, approval number 04-20-17-0073054, was conducted from April 2017 through November 2018. However, this study remained incomplete due to the lack of participants. Thirteen students completed all surveys that were a part of this study. One of my challenges in this study was obtaining proper consent. Many students qualified based on their online graduate status, but they did not respond with the required consent form. Another challenge was to have qualified students complete all surveys. Those included a barriers and demographic survey as well as the motivators instrument. Using the Exercise Motivations Inventory-2 (EMI-2) instrument, the motivators for physical activity for online graduate students were evaluated as more intrinsic, more extrinsic, or a combination. Evaluating motivators for online graduate students to exercise or begin exercising is a starting point to develop programs that can be included in online curriculums.

Identifying the barriers to physical activity in an online university setting is critical to understanding why students are not meeting the guidelines and what can be done to remove barriers. In an older study of traditional universities, the barriers to physical activity included a lack of time, lack of motivation to exercise or participate in sports, and lack of support (Daskapan, Tuzun, and Eker, 2006). These same barriers can be hypothesized to exist among nontraditional students as well. However, barriers that were significantly higher among nontraditional students included fearing injury, lacking skill, and lacking resources (Kulavic et al., 2013). Barriers and motivators for physical activity participation in online graduate students require further research to close some of the gaps in the literature. This case study contributes to the body of literature by adding a perspective of motivators and barriers for physical activity of online graduate students in this current technologically advanced time. Various colleges may use this knowledge to create opportunities for online graduate students to have health programs incorporated into their academic experience.

Problem Statement

In this case study, I emphasized the lack of health-related programs for adult online graduate students that can be a barrier to having online students participate in physical activity. Online courses have grown in popularity over the past decade, and surveys have revealed that over 6.7 million students take at least one online course (Van Doorn & Van Doorn, 2014). This case study was based on an IRB approved original study that surveyed barriers that interfere with exercise, including a lack of health programs provided in an online classroom setting. In addition, a survey of motivators to

begin an exercise program was given to the university population of online graduate students. Barriers and motivators for physical activity among online graduate students can influence their level of participation in sports and exercise. Yan and Cardinal (2013) conducted a case study the United States, surveying Chinese female graduate students and their perceptions of physical activity. Although these were not online graduate students, cultural barriers, a lack of time, and the lack of information to get involved in physical activity programs were shown to be barriers amongst this population (Yan & Cardinal, 2013). Online graduate students may also lack the information due to not being on a traditional campus or having physical activity courses. Gaps in the literature exist as to defining motivators and barriers for physical activity among these online graduate students.

As differences exist between nontraditional and traditional students, as reported by Kulavic et al. (2013), online nontraditional students are likely to have differences in barriers and motivators just due to the nontraditional environment. The opportunities to participate in school-based physical activity programs may vary among schools, especially with respect to online programs. To obtain a more complete picture of barriers for the online student, additional research on access to fitness facilities, the ability to be involved in school-initiated activity programs, and access to wellness courses needs to be conducted.

Motivators to begin or continue physical activity for online graduate students also need to be identified. Motivators for students can be categorized as intrinsic or extrinsic. Intrinsic motivators include self-motivation, such as running a marathon or meeting a

specific fitness goal. Extrinsic motivators are provoked by the environment; one example is wanting to lose weight and improve appearance (Teixeira, Carraca, Markland, Silva & Ryan, 2012).

Understanding the complete picture of motivators for online graduate students, whether intrinsic or extrinsic, can encourage health programs that are targeted toward what will most likely motivate the student to increase or begin physical activity. Creating programs that can be individualized may help address different motivators for different students. The addition of a health course or partnership with local fitness facilities through social marketing, for example, may improve barriers in online programs (Sharma, 2017).

The online graduate student is already considered nontraditional, and their responsibilities may include taking care of a family and a full-time job, but the lack of opportunity compared to a traditional school-based setting may play a role in their inactivity. This case study was designed to better understand perceptions of motivators and barriers for this population, which may lead to the development of programs beneficial for students and faculty to be included in an online school. Previous researchers have suggested that the addition of health promotion programs can be helpful to the nontraditional student (Kulavic et al., 2013). This creates the need for further research to understand how much of an increase in physical activity could be attributed to providing opportunities for exercise and providing health educational programs in an online setting.

Purpose of the Study

The purpose of this qualitative study was to better understand physical activity participation for online graduate students and barriers, motivators, and challenges to collecting data in this population. Participation in physical activity was evaluated in the previous IRB approved study using a 1-week exercise diary. Surveys were used for barriers and motivators. Personal experiences with conducting the previous study were used for challenges in conducting this type of study. In this case study, I used the previously collected data to better understand the perceptions of barriers and motivators that have an influence on physical activity in the online graduate student. Motivators and barriers were explored for the online graduate population to form a better understanding of what could be incorporated for a successful regular physical activity routine. Challenges for conducting this type of study may assist future graduate students in design of their study.

The analysis for this study was qualitative and was based on the IRB approved study exploring motivators, barriers, demographics, and amount of exercise. In this study, the amount of physical activity performed by online graduate students was recorded in an online 1-week exercise diary. Motivators and possible barriers were investigated in-depth in this case study using online surveys and the EMI-2 instrument. One of my goals was to find characteristics of these graduate students, including specific barriers and motivators for physical inactivity or activity. Demographics collected included age, ethnicity, gender, education level, employment status, number of dependents, marital status, and enrollment status. These factors assisted me in understanding differences in

responsibilities, which may be barriers themselves, in addition to opportunity barriers faced by the online graduate student. There were challenges as all surveys were online or in a Word document to be emailed. Consent needed to be emailed in addition to the EMI-2 survey. Online students registered for the study, but they did not complete the consent or the surveys.

Research Questions

Research Question 1: What are the perceptions of physical activity barriers in this online population of graduate students?

Research Question 2: Which intrinsic motivators and extrinsic motivators influenced physical activity in this online population?

Research Question 3: What are the difficulties in collecting data from online graduate students?

Figure 1 shows the motivators and barriers for physical activity using the self determination theory.

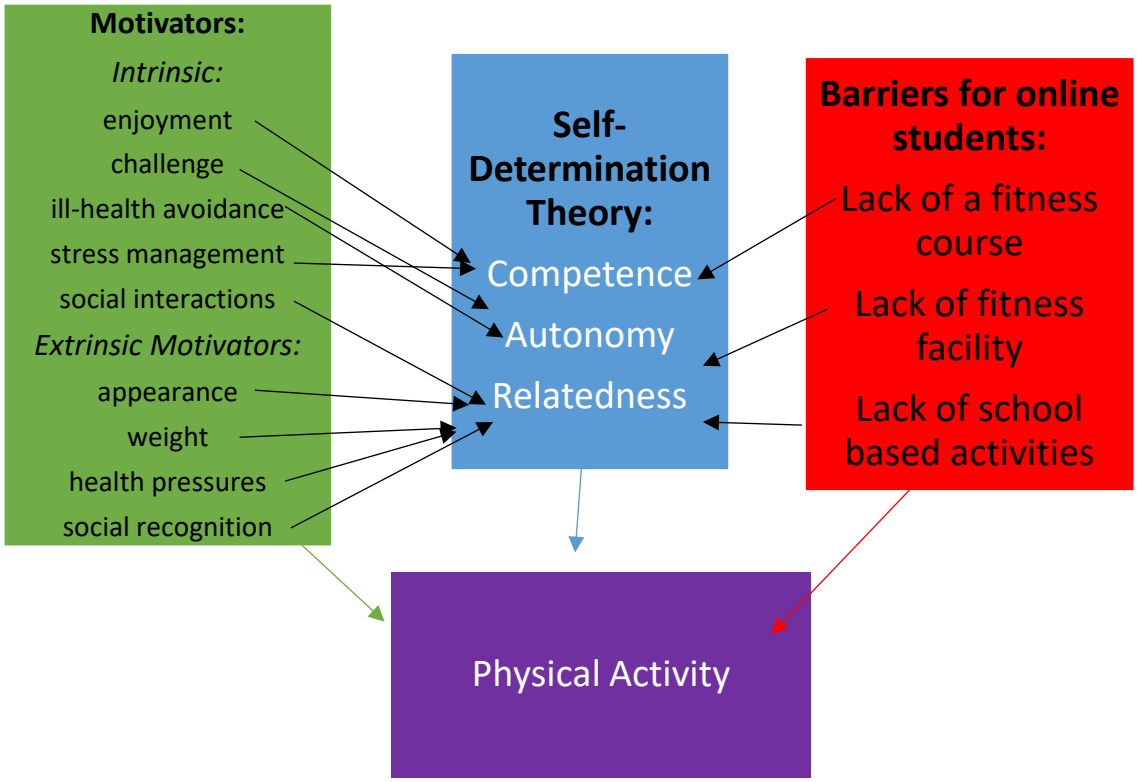

Figure 1. Motivators and barriers for physical activity using the self determination theory.

Theoretical Framework for the Study

In this study, I used the self-determination theory (SDT) to understand motivators for online graduate students. This theory was developed by Deci and Ryan (1980) and incorporates three psychological needs for self-motivation: autonomy, relatedness, and competence. Practitioners apply SDT to encourage behavioral changes and maintenance of those changes. Increasing physical activity is an example of one of those healthy behaviors (Fortier, Duda, Guerin, & Teixeira, 2012). One concept in this theory is that an individual's environment might not fulfill all the three of the above needs. If an individual's needs are met, he or she will continue a behavior or activity based on

intrinsic satisfaction, such as social engagement (Ingledew & Markland, 2008). The individual might also continue based on extrinsic motivations such as improved appearance (Kilpatrick, Hebert, & Bartholomew, 2005). The constructs of SDT and their influence on physical activity still has many inconsistencies in the literature and needs further research (Teixeira et al., 2012).

I used the EMI-2 in this study, which has been used in both quantitative and qualitative studies. This instrument was developed using SDT as its foundation (Markland, 2014). According to Markland (2014), the instrument includes a series of questions intended to identify the individual's motivators for continuation of exercise or beginning exercise. These motivators include intrinsic motivators such as avoidance of ill-health and personal challenge. This instrument also includes an evaluation of extrinsic motivators that are encouraged by external factors such as appearance and showing worth to others (Markland, 2014).

Using the SDT and EMI-2 instrument provides insight into what motivates online graduate students to exercise or begin an exercise program. In this case study, I reported perceived barriers to exercise for online graduate students. The identification of barriers might have a correlation to the lack of motivators and compound physical inactivity in this population. For example, using one of the constructs from SDT, competence, a person would have to be confident that they could accomplish the change needed for increased physical activity (Ryan, Patrick, Deci, & Williams., 2008). If the online graduate student does not have a health course available or an affordable fitness facility, it could affect their competence and autonomy.

Nature of the Study

To undertake this qualitative study, I used previously collected data from an IRB approved study about motivators and barriers to physical activity among online graduate students at an online university. The instrument that was used was the EMI-2 (see Markland, 2014). This tool was modified by adding a survey assessing barriers to exercise, including access to a fitness facility, a fitness course, and intramural sports or other activity programs provided by the school. Demographic information was also collected. The amount of physical activity performed during a 1-week time period was collected with an online journal.

The population surveyed was online graduate students enrolled at a university setting. The surveys were available through an online participation pool. The questionnaires had items to define demographics, questions to assess current exercise habits on a weekly basis as well as contemplation of exercise, current barriers, and items to assess what type of motivators are defined by the individual. Whether a student was meeting exercise guidelines or not was defined by the guidelines for weekly exercise from the Office of Disease Prevention and Health Promotion (2018). Because exercise contemplation was included in the surveys, the EMI-2 instrument was appropriate for this study as it can be used to evaluate motivators for both current exercisers and those who are contemplating beginning a program (see Markland, 2014).

Announcements to participate were posted for online university students through an online participation pool in the previous IRB approved study. The population surveyed was defined as nontraditional and having one or more of the following characteristics:

full-time employment, enrollment as a part-time student, or financial independence, which typically includes an older age group (Vanslambrouck, Chang Zhu, Lombaerts, Pynoo, & Tondeur, 2017). The survey questions confirmed whether these students could be characterized as nontraditional, using the demographics collected. The exercise habits of this group were then compared to the national average of college student activity using the American College Health Association National College Health Assessment II and a national activity assessment, the Behavioral Risk Factor Surveillance System (see CDC, 2015).

The sample size was 13 participants recruited through the online participant pool. The population included students from a university enrolled in online programs at the graduate level. The names of the students were coded with a number to keep each participant anonymous.

Definition of Terms

Age: Age groups for this study were defined as (a) 18 to 24, (b) 25 to 34, (c) 35 to 44, (d) 45 to 54, (e) 55 to 64, and (f) 65+.

Autonomy: A construct in the SDT in which people have a need to have control over their lives (Ryan et al., 2008). This was evaluated using the EMI-2 instrument within the areas of challenge (Questions 14, 28, 42, 51), ill-health avoidance (Questions 2, 16, 30), positive health (Questions 7, 21, 35), strength and endurance (Questions 8, 22, 36, 47), and nimbleness (Questions 13, 27, 41). The questions were scaled 0 as *not being true at all* to 5 being *very true* for each (see Markland, 2014). A summation score for

each category were obtained, and the means were calculated for these categories (see Markland, 2014).

Barriers to physical activity: Barrier choices include (a) lack of a school-based health course, (b) lack of a fitness facility, and (c) lack of intramural or school-based sports. Perceived barriers were scored in a range of 0 to 3. This was interpreted as 0, *the item is provided*, 1, *the item does not interfere with physical activity*, 2, *the item somewhat interferes*, and 3, *the item interferes with physical activity*.

Competence: A construct in the SDT in which one has the confidence to make a change (Ryan et al., 2008). This was evaluated using the EMI-2 instrument with the areas of stress management (Questions 6, 20, 34, 46), revitalization (Questions 3, 17, 31), and enjoyment (Questions 9, 23, 37, 48). The questions were scaled 0 as *not being true at all* to 5 being *very true* for each (see Markland, 2014). A summation score for each category was obtained, and the means were calculated for the categories (see Markland, 2014).

Demographics: The demographics included age, ethnicity, gender, education level, employment status, number of dependents, marital status, and enrollment status in school.

Education level: The graduate students participating were enrolled in the master's or Doctoral programs.

Employment status: This demographic had the following choices: (a) full-time, (b) part-time, (c) self-employed, or (d) unemployed.

Enrollment status: This variable had the option whether the student was enrolled full-time or part-time.

Ethnicity: Ethnicity choices included (a) Hispanic or Latino, (b) not Hispanic or Latino, (c) American Indian or Alaskan Native, (d) Asian, (e) Black or African American, (f) Native Hawaiian or Other Pacific Islander, (g) White, or (h) prefer not to indicate.

Exercise Motivations Inventory-2: A tool used to identify motivators, both intrinsic and extrinsic, for physical activity or contemplation of physical activity scored as 0 being *not true at all* to 5 being *very true* for each. The scores were calculated as the means of the appropriate questions for each category, which included stress management, revitalization, enjoyment, challenge, social recognition, affiliation, competition, health pressures, ill-health avoidance, positive health, weight management, appearance, strength and endurance, and nimbleness. There was a total of 51 questions, and the categories were competence, autonomy, and relatedness. A summation score was obtained for the questions in each construct as previously mentioned under each construct definition. These means of each category were then calculated to understand which areas had a higher emphasis (see Markland, 2014).

Gender: This variable had the following options: male, female, or prefer not to indicate.

Marital status: This variable had the options of single, married, separated, widowed, or divorced.

Motivators: Intrinsic motivators can be defined as doing an activity because of inherent satisfaction such as gaining flexibility. Extrinsic motivators provoke someone to participate in an activity for reasons such as recognition (Teixeira et al., 2012). Intrinsic

motivators included stress management, revitalization, enjoyment, challenge, ill-health avoidance, positive health, strength and endurance, and nimbleness. Extrinsic motivators included questions for social recognition, affiliation, competition, health pressures, weight management, and appearance. Motivators were scored as 0 being *not true at all* to 5 being *very true*. The summative score was calculated, and then the means of the intrinsic items and the means of the extrinsic items were calculated (see Markland, 2014).

Nontraditional students: Nontraditional college students are defined as having characteristics such as financial independence, being employed full-time, being enrolled part-time in school, being older in age (over 21-65+ years of age), and having dependents (Vanslambrouck et al., 2017).

Number of dependents: The number of dependents was on a scale of 0 to 10.

Online student: Online students include those exclusively in an online educational program or in a hybrid program with online and in-class courses (Van Doorn & Van Doorn, 2014).

Physical activity: The American College of Sports Medicine suggested that exercise for healthy adults ages 18 to 65 should include moderate exercise of approximately 30 minutes a day 5 days a week or vigorous exercise for 20 minutes a day 3 days a week (as cited in Kulavic et al., 2013). The range included (a) meets exercise guidelines most weeks, (b) meets exercise guidelines some weeks, (c) does not meet exercise guidelines but does exercise, and (d) does not participate in physical activity.

Relatedness: A construct in the SDT in which one has the need for close relationships (Ryan et al., 2008). This was evaluated using the EMI-2 instrument with the

areas of social recognition (Questions 5, 19, 33, 45), affiliation (Questions 10, 24, 38, 49), competition (Questions 12, 26, 40, 50), health pressures (Questions 11, 25, 39), weight management (Questions 1, 15, 29, 43), and appearance (Questions 4, 18, 32, 44). The questions were scaled 0 as *not being true at all* to 5 being *very true* for each (see Markland, 2014). A summation score for each category was obtained, and the means were calculated for the categories (see Markland, 2014).

Self-determination theory: A general theory of motivation based upon three constructs: autonomy, competence, and relatedness (Deci & Ryan, 1980).

Assumptions

My first assumption was that case study was an appropriate method. My second assumption was that online graduate students do not have the same opportunities to participate in physical activities as traditional college students do. This assumption was based on the online program not offering a fitness facility locally for students for free or at a reasonable cost. This does not include the factor that the online graduate student may be employed full-time, which could make the cost of a gym membership not a factor if other family obligations do not interfere with the extra cost. Another assumption was that online graduate students have more responsibilities than traditional college students. This assumption may not be true for all online graduate students and may not limit the availability to exercise compared to traditional college students. The next assumption was that the surveys and exercise diaries were adequate and simplistic in collecting the needed information. This was an assumption used in a previous case study conducted by a university student (see Tomkins, 2014). This may have contributed to the lack of

participants in the previously approved IRB study due to the amount and complexity of some surveys. The last assumption was that the population surveyed was uniform. Students may have had different responsibilities than other students. Characteristics between the graduate students may vary as well as cultural differences.

Scope and Delimitations

The scope of this case study was to identify the barriers and motivators of a population of students who were surveyed for these characteristics and who identified difficulties in working with online students in conducting such research. Research on these characteristics are lacking for this population. The online student population will continue to increase as more online programs are available, so a better understanding of physical activity barriers and motivators can assist in forming programs for this population. The online setting should not be a barrier to physical activity if students need assistance.

The population in this study was limited to online graduate-level students only. Previous researchers have identified barriers and motivators for undergraduate students in a traditional setting (Kulavic et al., 2013), but the online setting has not been explored. Delimitations for this study were the population itself and possibly the research topic. Recruitment was difficult through the online participation pool because many students did not consent or complete all surveys. There were many sign-ups, but the lack of consent disqualified them from participating. Notifications were sent out to the entire participant list as reminders that emailed consent was needed to proceed. Only 13 students emailed their consent and completed their surveys.

Limitations

The case study method provides a very limited idea about the research issue, which was a limitation of this study. One major limitation to my previous IRB approved study was that the figures used to compare physical activity from the literature included both undergraduate and graduate students (see Kulavic et al., 2013). In this case study, I do not provide a generalizable analysis of actual activity levels of both types of online students. The American College Health Association National College Health Assessment II survey included all types of college students, whereas I only used online graduate-level students. One-week diaries were collected for activity, but the sample size was 13 students at the graduate level. This sample is a convenience sample, so participation may not be generalized to all online graduate students or to the general population.

Recall bias may be a factor when using surveys that rely on recall to understand the physical activity characteristics of this group. Recall and response bias can be present when students are reporting how much they exercise during the week. Timely entries can help to avoid this type of bias. In future research, the addition of more online graduate schools would strengthen the surveys. Time to collect the data was also a limitation. This study was conducted for an online doctoral dissertation, and it continued for approximately 1.5 years. During this time, only 13 students consented and completed the survey. Time limitations are present in a doctoral program.

The fact that the survey was provided online, and the participants remained anonymous may reduce some bias because reporting does not identify the individual. Students were coded by a research number. A benefit of comparing national averages that

includes individuals outside the age ranges of this study was that it provided a better picture of whether online graduate students are more deficient in the area of physical activity than all age groups combined, although the population was small. This reinforces the idea that barriers do exist more in the online graduate student population than in the undergraduate and younger age groups.

Significance of the Study

In this case study, I used the previously IRB approved study to provide new knowledge of physical activity habits, barriers, and motivators for the population of online graduate students. I also documented challenges of the process of collecting data from an online graduate population. This knowledge provides the means to develop health initiatives that can increase physical activity in this population. In order to design programs to increase physical activity targeted toward the online graduate student, motivators and barriers must be explored (Kulavic et al., 2013). The lack of research for online graduate students and their levels of physical activity created a need for first understanding their exercise habits, and if they were inadequate, then understanding what might be contributing to the lack of exercise. This contribution of knowledge may also be able to be extended to the online undergraduate student, but future studies should be conducted to explore specific factors associated with this population.

Barriers to physical activity among both traditional and nontraditional college students may differ in a specific college setting due to the availability of fitness facilities and additional resources (Kulavic et al., 2013). Therefore, the traditional setting may provide more opportunities for physical activity than the nontraditional setting. All

traditional college settings are unlikely to provide the same opportunities in sports and fitness facilities. Van Doorn and Van Doorn (2014) stated that an online setting may give a student more flexibility and assist in balancing their lifestyle. If flexibility assists in creating more control over life activities, then removing barriers for these students and educating them on the requirements and options for physical activity could result in an increase for physical activity and lower health concerns.

Dabbagh (2007) hypothesized that the type of motivators that exists for students in online college settings are different from those in more traditional educational settings. In order to validate this statement, I originally designed this study to identify motivators for the online graduate student. Surveys of barriers for online students can help identify differences for this population in addition to motivators. The barriers that exist may affect the motivators, but further research would be needed to explore those affects. This case study was designed to provide knowledge of the motivators and barriers among this group of students from the previous study, which can be the first step in creating positive social change by contributing knowledge on how to create more effective programs and opportunities to increase activity rates among online graduate students.

Physical activity promotion programs could include a comprehensive website that compiles physical activity guidelines, a health promotion course, samples of training routines, and a partnership of online academic programs with fitness facilities. The use of social marketing could be used to target online graduate students (Sharma, 2017). This would require partnerships with fitness facilities nationally. In addition to the benefits the students may receive with comprehensive health programs, the online faculty may also

receive benefits. In traditional college settings, faculty can also use the fitness facilities provided. Such a program would provide benefits to all in the online setting. This facet may increase the need for future studies that include faculty members and their possible motivators and barriers to exercise when they are employed by an online institution.

Summary

Physical inactivity is a risk factor for many chronic diseases, and the need to increase physical activity rates among the population has been established. The importance of physical activity should be enforced at an early age and continued throughout adulthood. In this case study, I examined ways to intervene in college populations. The characteristics of college students have changed over the years to include more nontraditional students, and, in addition, students have increasingly chosen to advance their education in a nontraditional setting such as in an online format.

The need for research to identify barriers and motivators for physical activity among online graduate students will increase as the use of online classrooms increase. The possibility that they lack fitness courses, school-based sports or activities, and fitness facilities is a concern as all of us try to increase physical activity rates for the overall well-being of the population. As graduate students contemplate exercise, they must overcome their barriers and be motivated to begin a regimen. In addition to understanding how much of a role the possible barriers play in physical activity, motivators for this population must be explored to develop programs appropriate for the online graduate student. Being that the graduate student is already considered nontraditional, other barriers may exist due to life's responsibilities.

Using the online university student population, surveys were given online to understand demographics, barriers, and motivators for physical activity. This case study provides a better understanding of the nontraditional graduate online student's barriers and motivators to physical activity based on the IRB approved study. This study also revealed challenges associated with conducting surveys for online graduate students. The knowledge gained from this study may be used to develop programs to increase physical activity among online students by creating opportunities for them. Programs will need to be further evaluated on their efficacy to make sure increases in exercise have been obtained. In the upcoming chapters, I present a literature review and my research methods.

Chapter 2: Literature Review

Introduction

As noted above, physical exercise is vital to the health and well-being of society. Diseases such as heart disease, various cancers, and diabetes are among the leading causes of death in the United States (Penglee et al., 2019). Interventions to reduce risk factors contributing to chronic disease could not be more critical at this time. Physical activity can reduce the risk of chronic conditions, and meeting or exceeding physical activity guidelines provide the most benefit (Penglee et al., 2019). Kulavic et al. (2013) stated that physical activity is vital for good health, and the need to increase physical activity rates among certain college groups has become essential (Yan & Cardinal, 2013). Physical inactivity is a risk factor to many chronic diseases that may be reduced through various educational courses or suppling the resources to be active.

Over 50% of college populations do not meet physical activity requirements (Kulavic et al., 2013). The 2013 Behavioral Risk Factor Surveillance System results revealed that 79.5% of the population surveyed, ages 18 and above, did not meet the required guidelines for physical activities (CDC, 2015). To conclude, physical activity has been supported repeatedly as being beneficial for decreasing the risk of chronic diseases. In addition, physical activity guidelines have not been met in multiple populations. Chinese female graduate students attending college in the United States have been identified as one specific group only exercising an average of 1.3 hours per week (Yan & Cardinal, 2013). Specific groups of college students should be explored to find

where improvements need to be made to increase their physical activity rates. I define the purpose of this qualitative case study in the next section.

As previously stated, the purpose of this qualitative case study was to explore the results of my IRB approved study of the online graduate population of an online university. I aimed to better understand physical activity levels of this group, which was based on their 1-week diary. I also aimed to explore the barriers and motivators that can influence physical activity in the online graduate student. Demographics were surveyed as well in my previous study. This case study may be beneficial to gain knowledge to remove barriers and incorporate motivators to promote physical activity in online programs.

Physical Activity Guidelines for Adults

Physical inactivity has been defined as participating in less than that the required amount physical activity needed to produce optimal health and reduce the chances of premature death or illness (Penglee et al., 2019). The guidelines for physical activity in adults, aged 18 to 65, are participation in 150 minutes of moderate activity or 75 minutes of vigorous cardiovascular activity per week minimally (Office of Disease Prevention and Health Promotion, 2018). In addition to cardiovascular training, strength training exercises are suggested to be performed two to three times per week (Office of Disease Prevention and Health Promotion, 2018). Additional benefits can be gained by surpassing the 300 minutes of moderate activity as well as increasing moderate activity to up to 300 minutes or vigorous activity up to 150 (Office of Disease Prevention and Health Promotion, 2018).

The Office of Disease Prevention and Health Promotion (ODPHP) (2016) also lists examples of moderate activities such as water aerobics, brisk walking, gardening, and certain types of dance. Vigorous activities are also listed, and instead of 300 minutes per week for maximum benefits, vigorous activity could be performed for 150 minutes per week. Examples of vigorous activities are jogging, aerobic dancing, and jumping rope (ODPHP, 2016). ODPHP also lists suggestion or examples of muscle strengthening exercise such as sit-ups, push-ups, and digging.

Intervention Strategies

Interventions for many age groups already have been researched, beginning with childhood and adolescence. Sharma (2006), for example, reviewed interventions made during childhood and adolescence. These interventions primarily involved a modification in physical activity and diet, and many resulted in short-term results (Sharma, 2006). Other researchers have explored whether smartphone usage has an impact on college student's physical activity (Penglee et al., 2019). The researchers used students in the health sciences field in Thailand and the United States (Penglee et al., 2019). Thai students were the most impacted by high levels of smartphone use, and the higher the levels of usage, the more physical activity decreased (Penglee et al., 2019). This was not present in U.S. students. Penglee et al. (2019) suggested that not all were impacted and that smartphones may be a tool in higher education. Especially with an online population and new health and fitness apps, this may be a possible intervention for certain populations.

Kulavic et al. (2013) used college-aged students for their study in a traditional college setting. They found differences between motivators and barriers in traditional and nontraditional students (Kulavic et al., 2013). The motivators for the traditional student were centered around challenge, social recognition, and affiliation; the nontraditional students were more motivated by health pressures and ill-health avoidance (Kulavic et al., 2013). While the barriers were similar between the groups, the nontraditional students had more barriers, such as fear of injury, lack of skill, and lack of resources (Kulavic et al., 2013). In Kulavic et al.'s study, the traditional college setting provided resources such as a fitness facility. The lack of resources for online students provided a barrier because of the absence of fitness facilities, group sports, and physical activity or nutritional courses.

The college population has received much attention and interventions to increase physical activity. If provided the resources and motivation, this population is easier to reach with a health course, for example (Kulavic et al., 2013). These resources could address the concern to increase physical activity found in previous research and be modified for online college graduate students (Kulavic et al., 2013). Looking at the percentages of college students who participate in exercise, a need to intervene at this stage is very important. The American College Health Association National College Health Assessment II surveyed college student's activity levels for both undergraduate and graduate students. The results of this study were that 47.4% of the college student populations were meeting physical activity requirements (see Kulavic et al., 2013).

Aaltonen, Rottensteiner, Kaprio, and Kujala (2014) conducted a study to better understand motives for participation in physical activity in men and women in their 30s. They used the Recreational Exercise Motivation Measure in their study. The results showed that active adults had motives of mastery, fitness, social interactions, enjoyment, and looking better (Aaltonen et al., 2014). The only motive that the inactive adults scored higher on was conforming to expectations (Aaltonen et al., 2014). The conclusions for this study was that intrinsic motivation correlates with consistent activity (Aaltonen et al., 2014). Because nontraditional college students may be in this age group, there are similar motivations that are found in my study.

Researchers previously mentioned have used traditional college settings. However, much less attention has been paid to online college students. Kulavic et al. (2013) reported that the population of online college students has continued to increase. This change in the college setting has resulted in an increased demand for further research regarding the barriers and opportunities of online students' participation in physical activities.

In this case study, I explored barriers and motivators of physical activity in online graduate students at an online university from the previous IRB approved study. I also discuss the difficulties in sampling this online population. This case study can be added to the body of knowledge concerning opportunities for intervention strategies to increase physical activity in this type of population. In this chapter, I outline research strategies used to find the gaps within the literature. The theoretical foundation for this study was SDT and the EMI-2 instrument that was based on SDT. The conceptual framework of the

study is explained as to how SDT and the EMI-2 instrument are organized based on previous literature.

Literature Research Strategy

This literature review was conducted using a variety of databases. Through Walden University, the database that was used to search for peer-reviewed articles was ProQuest. I also used PubMedCentral.gov in addition to PubMed.gov to access articles. Google Scholar was also used. In addition to these journal articles, the CDC website was used to provide suggested exercise guidelines and statistical information from the Behavioral Risk Factor Surveillance System (BRFSS) concerning physical activity rates in the United States.

Key terms used in theses searches included the following:

- *characteristics of nontraditional students,*
- *physical inactivity,*
- *physical inactivity in adults,*
- *impacts of physical inactivity,*
- *characteristics of online students,*
- *nontraditional college students and physical inactivity,*
- *online college students and physical inactivity,*
- *self-determination theory,*
- *self-determination theory and physical activity,*
- *motivators for college students and physical activity,*
- *barriers for college students and physical activity,*

- *case studies and qualitative studies for physical inactivity,*
- *barriers for nontraditional college students and physical activity,*
- *barriers for online college students and physical activity, and*
- *Case studies*.

This scope of the literature review included articles published within the last 10 years, with the exception for the seminal literature on the SDT. Most of the articles chosen were published within the last 5 years. The older articles were necessary because there were few studies on nontraditional college students and physical inactivity.

Seminal articles were used for the SDT. Other journal articles included peer-reviewed articles that were primary sources. The CDC and ODPHP websites were used for general physical activity guidelines and survey information including physical activity in the United States.

There were cases where very little research was found. The lack of physical inactivity studies for online college students was a gap in the literature. Small or specific populations were studied, and many of these articles were used. The literature was pieced together to gather information about college students and their motivators and barriers for participation in exercise. Traditional college students and exercise have been well studied, and nontraditional students also have been studied some, but not to the degree that traditional students have been. Motivators and barriers for exercise in many populations have been researched using SDT, but the online nontraditional college population has not been researched.

Theoretical Foundation

Self-determination theory (SDT) evolved from previous research of intrinsic motivators, but the theory was expanded to include extrinsic motivators. This theory of motivation is based upon three constructs. These constructs are autonomy, competence, and relatedness (Deci & Ryan, 1980). Numerous publications have been written using this theory to understand motivations for various behaviors. Kulavic et al. used this theory to better understand motivators for exercise in traditional and nontraditional college students (Kulavic et al., 2013). Furthermore, Fortier, Duda, Guerin, and Teixeira (2012) summarized and reviewed the different applications of STD in implantation and the review of health programs.

SDT can be used to understand what type of motivations are needed to participate in or initiate a healthy behavior pattern (Ryan, Patrick, Deci, & Williams, 2008). Physical activity is one healthy behavior that this theoretical model can be used to better understand motives for individuals to exercise. These motivators may be different for various age groups (Kulavic et al., 2013). Research on motivators and barriers to exercise for online college graduate students is lacking, however. These students are considered nontraditional, which may create more or different barriers to participation in physical activities (Kulavic et al, 2013). For example, the lack of a nontraditional college setting may contribute to the loss of opportunities to exercise due to the absence of physical fitness facilities.

Beginning with the first construct, autonomy, the individual must understand the importance or value of the healthy behavior. Using external rewards in this area may

create short-term changes, but they have not been shown to be effective for long-term behavioral changes (Ryan et al., 2008). Friederichs, Bolman, Oenema, and Lechner (2015) conducted a study that found that high levels of autonomous motivation correlated more with an active lifestyle. Autonomy was evaluated by Teixeira, Carraca, Markland, Silva, Ryan (2012), and the conclusion was that autonomy was important for the individual to exercise.

The second construct, competence, can be applied to a healthy behavior such as the confidence to perform and adhere to the change. This construct and autonomy are very important for the understanding of the need to change and the confidence to do so (Ryan et al., 2008). The final construct, relatedness, can include looking for input from other individuals such as physicians, co-workers, or friends. Relationships govern this construct to influence the behavioral change that is desired (Ryan et., 2008).

The instrument used in the previous IRB approved study, the Exercise Motivations Inventory 2 (EMI-2) instrument, was developed by Markland (2014) to evaluate motivators for exercise. This instrument is based on SDT, and it is used as an evaluation tool to understand which intrinsic and extrinsic motivators are present in order to continue or initiate physical activity (Markland & Hardy, 1993). A series of questions are scaled from being true to not true as motivators. The answer key to the questionnaire sums the questions as they are arranged in categories to evaluate the types of motivators (Markland & Hardy, 1993). This instrument was be used to gather information in the previous study for the types of motivators that are present in the population of online graduate students. This instrument has been used in previous research to understand

motivators for exercise in college students in a traditional setting (Kulavic et al., 2013). The EMI-2 survey was utilized in the previous IRB approved study, and this case study explores the motivators for this population identified in that study.

A summary of research articles using SDT and its influence on healthy behaviors are summarized in Table 1. SDT and the EMI-2 instrument are used in this study to add to the body of literature for exercise motivators among online graduate students. In addition to motivators, barriers, such as access to fitness facilities, health courses, and intramural sports, will be examined for this group. Barriers may also influence motivators (Kulavic, et al., 2013) by decreasing autonomy, competence, and relatedness. Using the SDT approach, the students in this population need to be motivated by autonomy and feel competent in themselves to perform the activity. The third construct, relatedness, could be accomplished by a school-initiated exercise program that may provide interactions between students.

Table 1

Summary of Self-Determination Theory Studies

Author	Purpose of study	Study results
Deci & Ryan, 1980	Defining Self-Determination Theory	Three constructs are defined as autonomy, relatedness, and competence
Kulavic et al., 2013	To better understand motivators for college students to exercise in a traditional setting	The results are the differences and similarities between traditional and nontraditional students regarding motivators and barriers for physical activity.
Fortier, Duda, Guerin, and Teixeira, 2012	Summarized multiple applications and articles using SDT and health behaviors and interventions	The result of this study is that autonomous motivation is important for healthy behaviors such as physical activity.
Ryan, Patrick, Deci, & Williams, 2008	To understand motivators and their influence on behaviors	Summarizes how the three constructs are important in changing or maintain a healthy behavior.
Friederichs, Bolman, Oenema, and Lechner, 2015	To use SDT to better understand motivation for physical activity	The result of this study is that the construct, autonomy, is important for leading an active lifestyle.
Markland & Hardy, 1993	Illustrates how the EMI-2 instrument, based on SDT, can be used to understand motivators to continue exercise or begin exercise	The series of questions in the EMI-2 are listed and the calculations to apply the instrument.

SDT and the EMI-2 Instrument Applied

Using the EMI-2 instrument and SDT, motivators for online graduate students to participate in physical activity was surveyed. The instrument scored the motivation as a summation of items or questions in the survey. The categories of motivators are stress management, revitalization, enjoyment, challenge, social recognition, affiliation, competition, health pressures, ill-health avoidance, positive health, weight management, appearance, strength and endurance, and nimbleness (Markland, 2014). The survey and key for the EMI-2 instrument is in Appendix A (Markland, 2014). The theoretical framework for this study uses the three constructs of SDT: (a) autonomy, (b) relatedness, and (c) competence (Deci & Ryan, 1980). The items within the survey are classified by these three constructs. In addition to motivators, barriers were evaluated for these online graduate students that include: (a) lack of a fitness course, (b) lack of a fitness facility, and (c) lack of school-based activities (see Figure 1).

Motivators are subdivided into intrinsic and extrinsic motivators. Intrinsic motivators include enjoyment, challenge, ill-health avoidance, stress management, and social interactions. Extrinsic motivators were appearance, weight, health pressures, and social recognition. This subdivision was based on multiple studies using the EMI-2 instrument and SDT or just SDT for understanding motivation for physical activity. Markland and Ingledew (2008) categorizes these motivators in a similar manner such as appearance and weight being externally motivated. Using the SDT model to evaluate exercise motivation, enjoyment and the value of exercise were categorized by Friederichs, Bolman, Oenema, and Lechner (2015) to be intrinsic motivators. In this

study, an external motivator will include social recognition (Friederichs, Bolman, Oenema, & Lechner, 2015)

After categorizing the motivators as intrinsic or extrinsic, each motivator was put into a construct of SDT. In the construct competence, enjoyment and stress management are included. This is based on confidence being achieved from the individual performing the activity (Ryan et al., 2008). Under the construct, autonomy, challenge and ill-health avoidance were located. This is supported in that autonomy emphasizes the value of a behavioral change to the individual. This has been shown to be more valuable than giving external rewards, as those rewards may not change the long-term behavior (Ryan et al., 2008).

Friederichs, Bolman, Oenema, and Lechner (2015) conducted a study based on the three constructs of SDT on motivation for physical activity. Their results showed that autonomous motivation was the most influential behavioral change (Friederichs et al., 2015). Under the last construct, relatedness, social interactions, appearance, weight, health pressures, and social recognition were used in this study. This was based on the need to support input on behavioral change (Ryan et al., 2008).

Barriers for exercise can also be categorized into the three constructs from SDT. The first barrier, lack of a fitness facility, was placed in the competence category. A fitness class could give the individual the confidence to perform the activity. With confidence in the activity, competence can be achieved (Ryan et al., 2008). The second barrier, lack of a fitness facility, was placed in the construct of autonomy. The healthy behavior can be performed in a setting that may not have been available before. This new

setting can add value to the behavior (Ryan et al., 2008). The last barrier, lack of school-based activities, was placed in the relatedness category. This is supported by social interactions of an instructor or coach providing reinforcement of the healthy behavior (Ryan et.al, 2008) (see Figure 1).

Literature Review Related to Key Variables and/or Concepts

Kulavic, Hultquist, and McLester (2013) conducted very similar research to understand physical activity barriers and motivators in traditional and nontraditional college students. Their study also used the EMI-2 instrument to evaluate motivators that lead to the participation in physical activity. Their study included college students, both traditional and nontraditional, all students were on a traditional campus.

The barriers in Kulavic et al. (2013) discovered tended to be about the student's thoughts or feelings about exercise. For example, nontraditional students had more of a fear of injury during exercise than traditional students (Kulavic et al., 2013). They also found the motivators for exercise to be significantly different between traditional and nontraditional students in the areas of social recognition, affiliation, health pressure, challenge, and competition. This study is limited by geographical location, since all students had access to the fitness facilities on campus, and the questions were self-reported (Kulavic et al., 2013).

Friederichs et al. (2015) used SDT to understand motivators for physical activity. In their study, adults with an average age of 44 were used. They concluded that exercise had three motivational clusters. These were a low motivational cluster, a controlled cluster, and autonomous cluster (Friederichs et al., 2015). Their findings from this study

showed that the autonomous cluster produced the most favorable behavior toward physical activity (Friederichs et al., 2015). The study emphasizes the importance of the autonomy construct in the decision to participate in physical activities.

Teixeira, Carraca, Markland, Silva, and Ryan (2012) compiled studies that used SDT and exercise motivation. The studies were cross-sectional, experimental, and prospective studies. Interventions using SDT were also included. Some of the results of this compilation was that autonomous motivation and physical activity had a positive relationship, and that intrinsic motivation was associated with longer term exercise adherence (Teixeira, Carraca, Markland, Silva, & Ryan, 2012).

In this study, the participants are to be nontraditional online graduate students. Quintiliani et al. (2012) conducted a study using nontraditional college students, seeking to understand more about what influenced their physical activity participation and nutritional behavior. This study is significant in that it defined nontraditional students and identified them as a group that is generally less healthy nutritionally and physically (Quintiliani et al., 2012). The study was conducted in a traditional college setting, and they found that with nontraditional students: (a) home, (b) work, and (c) school can have positive impacts on nutrition and physical activity. They suggested interventions that encouraged positive behaviors that can be implemented at home, school, and work (Quintiliani et al., 2012).

These studies were all designed to gain a better insight into what motivates college students to exercise. Physical activity declined over the years, and chronic diseases such as heart disease and cancer has increased in the general population (Kulavic

et al., 2013) Kulavic et al. used the EMI-2 instrument to evaluate motivators for college students in a traditional setting. They did find differences between traditional and nontraditional students as far as motivators and fear, but the study was limited because students self-reported and the sample was drawn from a fitness and wellness course (Kulavic et al., 2013).

Friederichs et al. (2015) used the SDT model to find what motivates individuals to meet physical activity guidelines. The individuals that participated in this study were of ages that would be perceived as nontraditional, but this study was not conducted in a college setting. The limitations described by the authors are the self-reporting from the participants, and that is was a cross-sectional study. This type of study limits inference of a causal relationship from the results (Friederichs et al., 2015). Another limitation is that the study focused more on inactive individuals, and some questions were asked in the questionnaire that assumed the individual currently exercised (Friederichs et al., 2015).

Teixeira et al. (2012) conducted a review of studies on physical activity using SDT. The construct, autonomy, was reported to be very useful in motivating physical activity participation. Intrinsic motivators were also associated with long-term physical activity habits in individuals (Teixeira et al., 2012). Compiling this review was beneficial in understanding the best motivators for the long-term and discerning those constructs that make the individual competent in exercising. The author's stated that their largest limitation was the heterogeneity of the sample group, which varied widely in age, fitness status, and weight (Teixeira et al., 2012).

Quintiliani et al. (2012) conducted a study specifically using nontraditional college students as its participants. They surveyed the participants about factors in the home, work, and school to obtain information on which could have an impact on nutrition and exercise. This study was a qualitative study, and, as noted, the participants were college students that were considered nontraditional (Quintiliani et al., 2012). Insight was gained as to the barriers faced by this group when they tried to exercise or ate healthfully (Quintiliani et al., 2012). The type of study is limiting itself, and some of the findings should be incorporated into a quantitative study.

Studies about physical activity patterns and SDT are abundant. College students have been one of the populations most frequently studied. This is likely due to the number of interventions available such as offering a fitness facility on campus. There is a gap in the literature regarding college populations that participate in online programs. The nontraditional students have been included in a few studies concerning physical activity patterns, but studies focusing on motivators and barriers for nontraditional online college students are lacking.

As noted, the nontraditional college student tends to have more responsibilities such as working and having a family while in school (Quintiliani et al., 2012). Some of these responsibilities are barriers to physical activity, but additionally, opportunities and programs to increase physical activity through the school may not be present. Understanding what motivates and is a barrier to online graduate students can add to the body of knowledge, so that programs to support the healthy behavior may be developed.

Significant findings for physical activity in college students and adults are listed in Table 2. This table includes influences or motivators for physical activity or inactivity.

Table 2

Physical Activity Studies and Significant Findings

Authors	Significant findings of physical activity studies
Kulavic, Hultquist, and McLester, 2013	Motivators and barriers to participate in physical activity were significantly different among traditional and nontraditional college students. Students in a traditional college setting had much easier access to facilities and sports.
Friederichs, Bolman, Oenema, and Lechner, 2015	The average age for adults in this study was 44, and this age group is comparable to that of nontraditional students. This study's results were that autonomy was crucial for to maintain a healthy lifestyle.
Teixeira, Carraca, Markland, Silva, Ryan, 2012	Autonomy was also important for physical activity as this study showed.
Quintiliani et al., 2012	This study evaluated nontraditional college students in a traditional college setting. The influences supporting exercise came from the home, school, and work.

Qualitative Studies

Qualitative studies have been conducted to explore physical activity and college students. Case studies over this broader topic have been rare, but they have covered specific college populations. There is a gap in the research for barriers and motivators of

online graduate students for physical inactivity. In this section, I will cover some supporting qualitative studies.

The first study is a case study that explores the perception of exercise for Chinese female international graduate students (Yin & Cardinal, 2013). These students were not identified as online students, but they were attending traditional schools in the United States (Yin & Cardinal, 2013). This population of students had barriers to physical activity that included a lack of time, cultural barriers, lack of social support, and the lack of information to begin an exercise program (Yin & Cardinal, 2013). Some of the facilitators were social support, resources, and overall health (Yin & Cardinal, 2013). Some of these barriers and motivators are ones covered by my previous IRB approved study that is the basis for this case study. Lacking a direction or resource for participating in physical activity may be a common barrier among specific college populations.

The next study is a qualitative study that covers health and fitness app use in college students (Gowin, Cheney, Gwin, and Wann, 2015). Considering that the online graduate student is somewhat fluent in technology, the use of health and fitness apps may be a great incorporation for an online curriculum (Gowin et al., 2015). This study was conducted on a traditional campus, and the ages of these students were from 18-30 years of age (Gowin et al., 2015). The authors found that in this study the students downloaded an app for health or fitness to achieve one of two goals (Gowin et al., 2015). They found that two different groups formed and were either downloading the app to support a behavior or begin a new behavior (Gowin et al., 2015).

The final qualitative study used focus groups for students attending a Belgian university (Deliens, Deforche, Bourdeaudhuij, and Clarys, 2015). These focus groups were used to explore the behaviors of physical or sedentary activity (Deliens eta l., 2015). The authors found that physical activity may be influenced by self-discipline, time and convenience of the activity which were individual factors (Deliens et al., 2015). Other factors were social support, their physical environments such as accessibility, and their macro environment such as the media (Deliens et al., 2015). Some suggestions made by the authors were providing more on campus activities as well as incorporation into the curriculum (Deliens et al., 2015).

Understanding the physical activity patterns of online graduate students compared to other college populations and other adult populations is important because online education is increasing. Whether online students have more barriers to physical activity needs to be evaluated to determine effective means to promote exercise. According to previous surveys, an elevation in physical activity is needed in the traditional as well as online student (see Kulavic et al., 2013). Motivators and barriers may be somewhat different in the online student due to the lack of traditional college facilities and the social support of other students on campus.

Summary and Conclusions

Chronic diseases have been a concern for some time, and physical activity is a healthy behavior that could prevent some of these diseases. Many studies have reported that approximately 50% of the college population does not get the appropriate physical activity for health benefits (Deliens et al., 2015). College students have been the focus in

many studies concerning physical activity patterns, and this population can be reached by many intervention strategies. Traditional and nontraditional college students have been surveyed to understand barriers and motivators on traditional campuses (Kulavic et al., 2013). With the increasing population of online students, the need for studies that include an evaluation of their barriers and motivators is becoming necessary.

Online students at the graduate level may have compounding variables due to their responsibilities and the lack of resources. The EMI-2 instrument is based on SDT which has been used by multiple studies such as Kulavic et al. (2013) and Friederichs et al. (2015) to better understand what is needed for an individual to begin and incorporate a physically active lifestyle. Since many college students do not meet activity guidelines, this group has a need for intervention (Kulavic et al., 2013). Reaching online college students can be possible through courses and providing resources. While many studies target college students using SDT to understand physical activity participation, the gap in the literature is how to better understand these variables in the online graduate student population. This case study reports the findings of my previously approved study to fill a gap in the literature. The survey included questions pertaining to demographics and characteristics such as responsibilities. The EMI-2 instrument was included in the survey to better understand motivators for this population to exercise. The survey had questions to understand barriers that may be specific to this group such as lack of resources. The goal of this study is to gain a deeper insight on physical activity habits, motivators, and barriers for online graduate students. In addition, this case study will address the

difficulties in surveying an online student population. This study may lead to larger quantitative studies that have access to a larger online student population.

Chapter 3: Research Method

Introduction

The purpose of this qualitative study was to better understand the physical activity characteristics among online graduate students and identify difficulties in collecting data from online students. Exercise diaries were kept for 1 week in the previously approved IRB study; the approval number for this study was 04-20-17-0073054. Demographics, barriers, and motivators were collected for this population in addition to the diaries. Survey Monkey was used for diaries, demographics, and barriers, and the EMI-2 instrument was used for motivators. An online university was used for the online population included in this study.

Characteristics were explored in-depth such as motivators and barriers to physical activity in online graduate students. In order to find the motivators in this group, Markland (2014) developed an instrument called the EMI-2. This instrument is based on SDT and includes questions or items to better understand motivation to begin or continue exercise. This EMI-2 contains questions that are relevant to each construct of STD. These constructs are competence, autonomy, and relatedness (Deci & Ryan, 1980).

The barriers that were assessed in this study were a lack of fitness courses, a lack of fitness facilities, and a lack of school-based sports. These barriers were important to include in this evaluation because in a traditional setting, courses, gyms, and sports are typically offered. Due to these barriers, online graduate students may have very different motivators and barriers based on their setting and responsibilities. Studies to better understand online students are very limited, especially for their physical activity. With an

increase in online students, this population needs to be better understood (Kulavic et al., 2013).

In this chapter, I include the design of this case study. I discuss the methodology and address the population, sampling, participation recruitment, the instrument, and the constructs of SDT. Data analysis and trustworthiness are included next in this chapter. I conclude with a summary.

Research Design and Rationale

In this case study, the research questions addressed were as follows: The first question addressed the perceptions of physical activity barriers in this online population of graduate students. The second research question explored intrinsic motivators and extrinsic motivators of the previously studied population. Finally, the difficulties and challenges of surveying this online population are discussed. In this case study, I report the findings of those three questions.

The amount of physical activity performed by the online graduate students during a 1-week period was recorded in the previous study. The following characteristics to be discovered amongst this group were barriers to physical activity: (a) lack of a fitness facility, (b) lack of fitness courses, and (c) lack of intramural sports and activities. The second set of characteristics to be explored were motivators or motivation to participate in physical activity. This was done using the EMI-2, which includes questions to understand motivators to exercise or to begin exercise (see Markland, 2014).

Demographics were collected to better define the population of online graduate students at the university. Those were age, ethnicity, gender, education level,

employment status, number of dependents, marital status, and enrollment status (part-time or full-time). Nontraditional students, especially online students, have not had as much research dedicated to better understanding how responsibilities and lack of resources affect their health habits. The research design was the case study method, and I used the questionnaires covering physical activity during a week, perceived barriers, demographics, and the EMI-2 motivators survey from the previous study. The EMI-2 was used for motivators scaled from *not true* for the students to *very true* (see Markland, 2014). The questionnaires were posted on the online participant pool from April 2017 to November 2018. Parameters to sign up and participate was enrollment in a graduate program at the online university. I documented the difficulties encountered in collecting such data from online students.

Time constraints for the previous study were present due to the time enrolled and completing the dissertation process. Challenges were present in the previous study. Those included obtaining consent and participants completing all surveys. Time limitations to complete this case study were present due to standards on length of time allotted in the enrolled doctoral program.

This research design has the components to better understand the population and how much physical activity was performed by the participants, barriers perceived, motivators to exercise, and difficulties encountered in the previous study design. This knowledge may be used to design strategies to increase exercise in this population and to better design surveys or studies using this population. The previous study was not an intervention study, but it may be used to better understand possible interventions for this

health concern and population. Larger studies may be needed to further understand some of the trends in this study.

Role of the Researcher

As the researcher, I observed the exercise diaries, demographics, barriers, and motivator surveys. The students who attend this university participate in school in an online setting. I had no previous contact with the participants or person-to-person interactions. In this setting, the students were not pressured to participate in the previous study, and if they did feel uncomfortable reporting any information, they were made aware that they could leave the study at any time. The only communication by email was used to obtain consent or a gentle reminder to complete their surveys. There were no ethical issues that came to light for this study.

Methodology

The target population for this study was online graduate students from an online university who participated in the previously approved IRB study. With physical activity research lacking for online students and nontraditional students, the described population adds to the body of literature to better understand certain health habits. A sample online graduate student population at and online university in spring 2015 was 41,848 (Walden University's Office of Institutional Research and Assessment, 2015). Sampling an online population in the previous study was done by recruiting participants through an online participation pool.

By using the online participation pool, the population was limited to those graduate students who were registered within that system. The data collected from the

previous study resulted in a sample size of 13 participants. In this case study, I explored demographics, a 1-week exercise diary, motivators, barriers to physical activity, and difficulties from the previous study. Participants were given a number from the previous data to remain anonymous. SurveyMonkey was used to analyze data from the online surveys, and the EMI-2 was used for motivators along suggested guidelines of David Markland described in the next section.

Background of Data Collection from Previous Study

Graduate students were recruited through an online university participant pool and received a message that the study was available for participation. The demographics that were collected are as follows: The first demographic was age groups selected as (a) 18 to 24, (b) 25 to 34, (c) 35 to 44, (d) 45 to 54, (e) 55 to 64, and (f) 65+. Education level was divided into master's or Doctoral program enrollees, enrollment status in school was categorized as full-time or part-time, and employment status had the following choices: (a) full-time, (b) part-time, (c) self-employed, or (d) unemployed. The next demographic, ethnicity, was recorded as (a) Hispanic or Latino, (b) not Hispanic or Latino, (c) American Indian or Alaskan Native, (d) Asian, (e) Black or African American, (f) Native Hawaiian or Other Pacific Islander, (g) White, or (h) prefer not to indicate.

Gender was collected and recorded as male, female, or prefer not to indicate, and marital status had the options of single, married, separated, widowed, or divorced. The last demographic collected was number of dependents, which was on a scale of 0 to 10. Informed consent was required for participation and collected through email. Once that was collected, the links to surveys and EMI-2 were sent to each participant.

The data for this study were collected using questionnaires placed on Survey Monkey. Those surveys were sent only after consent. The links provided were to a 1-week diary by day and a demographics and barriers survey. The EMI-2 to evaluate motivators was sent in a Word document. The participants completed the EMI-2 and emailed it back.

Another item on the demographic survey asked students if they met physical activity guidelines. The standards for physical activity were outlined for the participants, and they were also questioned as to whether they currently met physical activity guidelines. The data were recorded as (a) meets exercise guidelines during the week, (b) partially meets exercise guidelines during the week (either cardiovascular or strength but not both), (c) does not meet exercise guidelines but does exercise, and (d) does not participate in physical activity. The potential for recall bias or misperceptions could be present when students reported these data.

The next set of questions was perceived barriers. Those barriers included (a) lack of a fitness facility, (b) lack of health or fitness courses, and (c) lack of intramural sports. This was interpreted as the item is provided, the item does not interfere with physical activity, the item somewhat interferes, and the item interferes with physical activity.

The EMI-2 instrument was used to evaluate motivators to exercise. Intrinsic and extrinsic motivators were included in this instrument. Intrinsic motivators included (a) stress management, (b) revitalization, (c) enjoyment, (d) challenge, (e) ill-health (f) avoidance, (g) positive health, (h) strength and endurance, and (i) nimbleness. Extrinsic motivators included (a) social recognition, (b) affiliation, (c) competition, (d) health

pressures, (e) weight management, and (f) appearance. Each motivator was placed within a construct as outlined in the definitions of Chapter 1. Motivators were scored on a Likert scale as 0 being *not true at all* to 5 being *very true*. The summative score was calculated, and then the means of the intrinsic items and the means of the extrinsic items were calculated (see Markland, 2014). Appendix A includes the questions, key, and permission to use the EMI-2 instrument.

Instrumentation and Operationalization of Constructs

The developer of the EMI-2 instrument was David Markland who worked with David Ingledew in 1997 (Markland & Ingledew, 1997). The previous EMI was developed in 1993 with David Markland and Lew Hardy (Markland & Hardy, 1993). These instruments are based on the three constructs of SDT, and the motives are placed in the category of one of three constructs (Markland, 2014). The instrument used in the previous IRB approved study was the updated EMI-2 which evaluates motives to exercise or begin exercise (Markland, 2014). Permission from Dr. Markland to use the EMI-2 instrument is found in Appendix A along with the instrument itself and the key.

In the original work on the EMI-2, Markland and Ingledew (1997), one of the difficulties of this instrument was whether the motives where consider intrinsic or extrinsic. The authors used a 95% confidence interval. Some items had to be left out or regrouped in elimination phases. Their results of correlations from pairing of items were a confidence interval of 1.0 and in some cases .997 (Markland & Ingledew, 1997). Alpha reliability coefficients for the second eliminations phase ranged from .686-.954 dependent upon the item (Markland & Ingledew, 1997).

The population used in this original work were male and females working in a government facility. Males had a higher participation than females when the questionnaires were returned for analyses (Markland & Ingledew, 1997). Phase 3 of study used models separating and including both genders, and the results were that all models were a good fit for the instrument. This study was the original work and included elimination phases in the process.

In another study evaluating barriers and motivators to physical activity on a traditional campus between traditional and nontraditional students, Kulavic et al. (2013) use the EMI-2 instrument. The EMI-2 instrument is on a 6-point Likert scale. This study had standard deviations on the items in the survey between 0.83-1.66, and the means of each item in the scale were calculated (Kulavic et al., 2013). Cronbach's alpha was acceptable at a value of .877 (Kulavic et al., 2013). The author's state the consistency and reliability were present with this instrument (Kulavic et al., 2013). The results of this study were that there were areas of statistically significant motivators and barriers between traditional and nontraditional students (Kulavic et al., 2013).

Kulavic et al (2013) was a pivotal study in the choice to use the instrument and theoretical base. This study was very close to what needed to be evaluated for online college students. Online students and characteristics of physical activity is a gap in the literature that needs further study. This case study explores the findings of the previously conducted study, and it should be followed up with a larger population of online students.

Procedures for Recruitment, Participation, and Data Collection

The students were recruited for the previous study through an online participant pool. A description of the study was posted, and the requirements to participate. Students emailed the researcher that they consented to the study in order to receive all surveys. Once consent was received, the links to surveys placed are SurveyMonkey were sent to the participant. They included a demographic survey and links for the exercise journal from Monday through Sunday.

The other document that was sent to the participants was the EMI-2 survey. This is in the form of a Microsoft Word documents. They filled in the answers, and then they emailed this survey back to the researcher. As they progressed, any questions that they had were emailed to the researcher. I collected the data, and the survey process lasted for one week for the participant in order to complete the exercise diary/journal. Participants clicked on the appropriate day of the week to record their exercise. Once they had completed their journal, demographic survey, and EMI-2 instrument, they had completed their participation. No follow up procedures were established. In addition, students that did not complete all surveys needed will not be considered to have completed full participation and are excluded. This case study will utilize the data collected in the following manner.

Data Analysis Plan

From my previous study, all variables were collected through surveys on SurveyMonkey and through Microsoft Word for the EMI-2. This previous collected data was used for this case study. Completion for each participant's survey was placed into a

spreadsheet to organize number of participants and complete responses. This spreadsheet was used to find the surveys that were the least completed. For research question 3, the frequency of missing surveys is reported. In discussing some of the challenges in collecting data from this group, finding holes in the data collection may indicate that some of the surveys were too time consuming or unappealing to fill out. Other challenges are categorized based upon the researcher's experiences.

Yin (2009) suggests that data analysis for those beginning the case study method can be challenging, and that this method is lacking a "recipe" or formula that is typically found with analyzing quantitative data. One suggested qualitative data software is Atlas.ti, but this type of software is typically used to compile large amounts of data (Yin, 2009). Yin (2009) suggests forming your own analytic strategies. My strategy for the perceived barriers was to categorize, create a data display, and tabulate the frequency. For the exercise diary, I compare patterns of previously reported physical activity status before entering the survey, and the weekly exercise journal reported during the previous study. These patterns are used to report frequency of physical activity in these 13 participants. If an entry in the exercise journal was incomplete, the day was considered a "non-exercise" day in the previous study. An assumption was made that the student did not exercise, and therefore they did not need to complete the day's entry.

The EMI-2 is somewhat of a lengthy survey and motivators were calculated based on the method provided with the instrument. Approval was received from David Markland, and the tool was used to his standards. This survey is categorized based on responses, and the frequency of the responses will be reported. Any application to the

theoretical framework is reported by frequency for autonomy, competence, and relatedness categories.

Trustworthiness

In this section credibility, triangulation, coherence, transferability, and dependability will be addressed. Credibility of this study has been established from the previously collected data. The surveys were discussed and adjusted to eliminate any researcher bias with leading questions. The EMI-2 was also previously established, and bias was not reported for this tool. The surveys and tools were not altered in this case study, and any possible researcher bias that may arise will be reported as such. Triangulation will be addressed by using the different sources of information from similar groups in the literature review.

Coherence of this study is the relevance of each survey that fits together to create an overall picture of a population that has been understudied as far as physical activity. Barriers, motivators, and physical activity participation are all important components in understanding what types of interventions or programs may work for this population. The surveys were designed to complement one another in order to produce a bigger picture. Transferability of this study may produce the same results, but generalization of the population studied would not be possible due to the small sample size and the way the sample was taken. The previous study was a convenience sample, but in the future a randomly selected population would increase the ability to generalize. In addition, the participants may be from different geographical locations, and their perceived barriers may be different due to cultural differences such as in previous literature (Yan and

Cardinal, 2013). Dependability of the type of data collection has been previously established by committee members, and the use of this data has not been altered.

In addition, the items on the EMI-2 instrument have been previously shown to be reliable. The survey questions were straight forward, and the perceived barriers were as well. Confirmability has been established with the wording and design of the EMI-2 questions. There were many open choices for the participants to choose. Any items that are unclear for a participant, such as the EMI-2 motivator questions, participants were directed to use their own interpretation and not the researcher's. The researcher did not answer any questions for the participants or lead them in any direction. All questions were interpreted and answered by participants in the study.

Ethical Procedures

The IRB application was approved for the previous study, and this case study explores the barriers and motivators collected by that study. The participants included limited personal information in the online questionnaire for demographics. Names or identifying personal information was not published or shared in any way to break confidentiality of information and responses. The participant was kept confidential as to their participation in this study. The participant was able to answer all questionnaires online at the location of their choice. They were to answer and report each week privately and not share their responses with anyone.

Students were recruited through an online university participant pool for approximately one and half years. A message was sent to students informing them of new studies, and they could log on to the site to enroll. Students chose if they would like to

participate in this study, and if it interests them as a brief description was provided. Students could drop out of the study if it becomes stressful or interferes with their studies.

Any data collection was limited to the researcher and the members included in the previous study. Interventions were not included. All data collection was kept anonymous, and the evaluator will be blinded during analysis. Data from SurveyMonkey was kept anonymous, and numbers were assigned to students for EMI-2 analysis. Storage back-up was performed each time information is stored, changed, or analyzed. A password was used to ensure the information is protected and can only be accessed by the evaluator.

The findings will be accessible to myself, chair, and committee members. All members will use passwords to protect the confidential material. Data from the previous study will be reported in this study. Once this study has been completed, the data will be archived or destroyed in accordance with the IRB and Walden University policy.

Summary

In conclusion, this case study will fill in gaps in the literature that describe physical activity patterns, motivators, and barriers for online graduate students based on a previously conducted IRB approved study. In addition, challenges to collecting data in this population are addressed. Questionnaires and demographics were posted on SurveyMonkey, and participants were recruited from an online university participant pool. A brief synopsis of the study was displayed, so students could make the choice to join if the study interests them.

Basic demographics were collected, and the names or identifiers of the participants were kept anonymous. Perceived barriers were collected in the survey as

well. The EMI-2 instrument was used to identify intrinsic and extrinsic motivators to participate or begin physical activity. The perceived barriers included the lack of fitness facilities, fitness courses, and intramurals. Students were also asked if they currently meet physical activity standards. Participants kept an exercise journal for one week to better understand how many students are meeting physical activity requirements. These findings are explored in this case study based on previous collection.

Credibility and dependability have been established for this study. Transferability should be possible even in a larger study, but generalization is difficult because this previous study was a convenience sample. Some variances may occur due to sample size. Triangulation will be established using previous research.

In the next chapter, more information will be included for to data collection of the previous study. Results for each category will be reported. More detail will be given for the week-long exercise diary. Intervention strategies were not included in this or the previous study that this case study is based on, but some students may have begun physical activity due to the health behavior being brought to their attention.

Chapter 4: Results

Introduction

The purpose of this qualitative study was to understand physical activity levels for online graduate students as well as barriers, motivators, and challenges to collecting data in this population. The research questions addressed in this study were to examine the perceptions of physical activity barriers in this online population of graduate students, which intrinsic motivators and extrinsic motivators influenced physical activity in this online population, and what the difficulties were in collecting data from online graduate students. Each research question is answered in more detail in the results section, but the data collection and analysis portions detail the setup of this study. I explain the setting for the study and the challenges encountered.

Demographics relevant to this study are also discussed as well as the initial response for physical activity participation. Data collection, data analysis, and trustworthiness are included in this portion before the results of the study. Discrepancies in the data are explained, such as when students did not complete the exercise journal for the day, no exercise was entered or assumed. I conclude this chapter with a summary.

Setting

This study was completed online through SurveyMonkey and through a Word document that evaluated intrinsic and extrinsic motivators. All students were recruited using an online participation pool in the previously approved IRB study. Students sent emails of the Word document when finished with the EMI-2. They only communicated by email for the consent and EMI-2, unless they were asking a question. Due to the

nature of the study, the subject may have brought about more awareness of physical activity participation, and some of the results of the diary may reflect that increased awareness.

Some cardiovascular activity minutes that were recorded were extremely high for the examples given in the question. The question posted is “How many minutes of at least moderate cardiovascular activity did you perform today? Examples include elliptical, brisk walk, light jogging.” Numbers recorded for minutes per day went up to 540 minutes. The higher numbers were not explained by the participants, but this may be explained by a profession in which the participant walks all day, such as mailman, teacher, or in the healthcare setting such as in a hospital. The possibility that the participants became more aware of physical activity could have increased the minutes of cardiovascular activity and number of strength training sessions during this week of recording activity.

Demographics

In the previously approved study, the demographics collected were gender, age, program enrollment (Masters or Doctoral), enrollment status (part-time or full-time), employment status, ethnicity, relationship status, number of dependents living in the home, and current physical activity. Many of these demographics were not relevant to this case study, but some supported the status of being a graduate student, which was a requirement to sign-up to participate. These demographics also supported the fact that these students are nontraditional. Their current level of physical activity participation was also relevant to this study so that future programs can be made for this type of student.

Illustrated in Figure 2, the 13 participants answered whether they currently met guidelines at the time of the previous study.

In the previous study, 54% of the respondents were female and 46% male. The age ranges of the participants were 38% in the age range of 35 to 44, 38% were in the age range of 45 to 54, and the remainder were in the age range of 55 to 64. The age groups alone support that the students were all considered nontraditional students. Over 60% of the participants were enrolled in a Doctoral program and the remainder a master's program. Full-time enrollment was reported by 85% of the participants, and the remainder were part-time students. Whether self-employed or employed within a company, 69% of the participants reported working full-time. Sixty-nine percent of the participants were married, and most of the students had dependents living in their household.

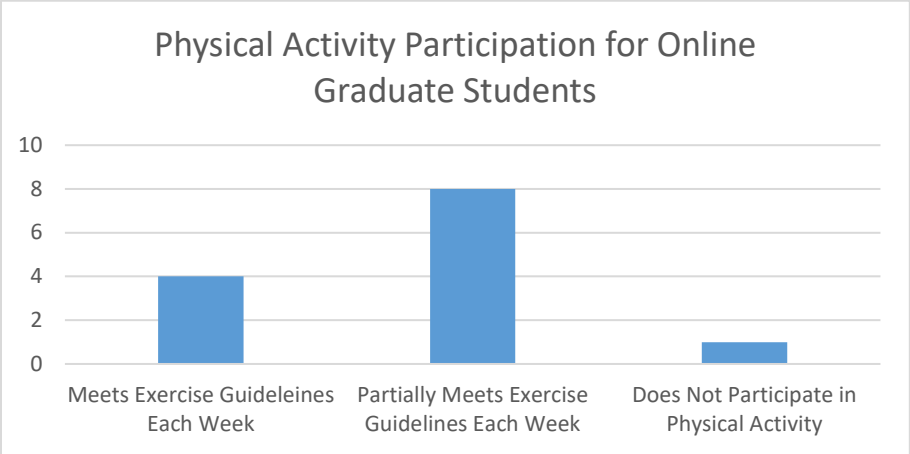

Figure 2. Physical activity participation for online graduate students.

Data Collection

In the previously approved study, the final number of participants included 13 graduate students. The survey was collected through the online participant pool as approved by the IRB study number 04-20-17-0073054. The consent for each participant was emailed to the researcher, and then the researcher sent the links to the demographics and barriers survey, week-long exercise diaries, and the EMI-2. The demographics, barriers and week-long exercise diaries were links through SurveyMonkey. The participant clicked on each link to complete. The demographics/barriers survey and a sample of a day for the exercise diaries can be found in Appendices B and C.

The demographics survey was a 12-question survey that could be completed within 5 to 10 minutes. The data collected from that survey were previously mentioned in the demographics section. The barriers to exercise included three questions about lack of a facility on campus, lack of a fitness course on campus, and lack of intramural or group activities on campus. The exercise diaries asked two questions each day for 7 days. These included the minutes of cardiovascular activity performed with examples and whether they did strength training exercises that day. The participants were to complete the diaries on the appropriate day of the week as they were labeled Monday through Sunday.

The EMI-2 instrument was sent by email in the form of a Microsoft Word. document. This document was 3 pages long, and this questionnaire had 51 items. The time frame to answer these questions may have been 45 minutes to 1 hour. The results were emailed back to the researcher, and the key provided by Dr. Markland was used to categorize the answers in to these categories: stress management, revitalization,

enjoyment, challenge, social recognition, affiliation, competition, health pressures, ill-health avoidance, positive health, weight management, appearance, strength and endurance, and nimbleness. Permission for Dr. Markland, the questionnaire, and key is provided in Appendix A.

The data were stored on SurveyMonkey, which is password protected. They were then transferred to a Microsoft Excel worksheet, which is also password and fingerprint protected. Participants were given a number to remain anonymous as data were being interpreted. No names were revealed in the results of this study.

Deviations from the originally approved IRB study did occur due to the number of participants who completed all surveys. The originally approved IRB study was quantitative in nature, but the number of participants did not meet the requirements to continue in that format. The lack of consent from students who signed up to participate was a large factor, and the EMI-2 instrument was not completed and sent back to the researcher. The EMI-2 survey was the longest of the surveys, and it was not as convenient as taking the survey online. The participants had to circle, highlight, or underline their answers before emailing back. The EMI-2 instrument can be found in Appendix A, and the categories and calculations for question groups can be found in the key.

During data collection from the previously approved study, there were some noticeably high numbers for cardiovascular activity for a day. These numbers were recorded in minutes, and there were multiple entries from a few participants that were in the hours range. The examples in the questionnaire included the elliptical, brisk walking,

and light jogging. One hypothesis was that some of the participants may have a profession in which they walk a large portion of the day. These participants could have been training for a marathon or walkathon as well. This could also be due to a workout in the morning and then in the evening, which was not separated in the question.

Data Analysis

Data were collected for the previous IRB approved study, and SurveyMonkey and Microsoft Word was used for survey collection. These data were transferred to an Excel spreadsheet, and numbers were given for each participant. Names were not included in the data transfer to keep them anonymous during data interpretation. These data were used for Research Questions 1 and 2. Experiences and the original spreadsheet used to document which participant turned in certain surveys was used to answer Research Question 3.

Because there were only 13 subjects, the use of data software such as Atlas.ti may not be as helpful due to the lack of large amounts of data (see Yin, 2009). To approach Research Question 1, perceived barriers to physical activity, the data were categorized and displayed, and the frequency was tabulated using the data collected in the previously approved IRB study number 04-20-17-0073054. There were three questions that addressed these barriers to online graduate students. Question 1 stated, “Is the lack of a fitness facility on campus a barrier to exercise?” Question 2 stated, “Is the lack of a health/fitness course on campus a barrier to exercise?” Question 3 stated, “Is a lack of intramural or group sports activities on campus a barrier to exercise?” The participants had four choices for each question. These choices were provided and collected in the

previous study. They included the following: “the item is provided free of charge at work, etc.,” “the item does not interfere with physical activity,” “the item somewhat interferes with physical activity,” and “the item interferes with physical activity.”

One-week exercise diaries were also kept by the participants, which provided insight on physical activity habits. Two questions were given to participants for this diary. They were as follows: “How many minutes of at least moderate cardiovascular activity did you perform today? Examples include elliptical, brisk walk, light jogging” and “Did you perform strength training exercises today?” If a day was not completed, it was calculated as 0 minutes of cardiovascular activity and “no” for strength training. Frequency of activity is reported in the results section.

Research Question 2 is addressed with the EMI-2 survey developed by David Markland. The specific questions and key are outlined in Appendix A. Permission to use this instrument can be found in Appendix A. Research Question 2 was aimed to better understand intrinsic and extrinsic motivators for physical activity in this online graduate population. This survey was categorized based on responses using the key provided. This key categorizes the questions into the following categories: stress management, revitalization, enjoyment, challenge, social recognition, affiliation, competition, health pressures, ill-health avoidance, positive health, weight management, appearance, strength and endurance, and nimbleness. The frequency of responses is reported in the results section, and the frequency as it applies to autonomy, competence, and relatedness is also reported.

For this case study, the categories that were place under intrinsic motivators included: enjoyment, challenge, ill-health avoidance, stress management, and social interactions. The categories under extrinsic motivators included: appearance, weight, health pressures, and social recognition. Revitalization, positive health, strength and endurance, and nimbleness were not categorized but may be included under intrinsic motivators. Affiliation and competition also not categorized may be included under extrinsic motivators.

The motivators as they relate to the self determination theory were categorized as follows for this case study. For the construct competence, enjoyment and stress management were placed. Challenge and ill-health avoidance were placed under the construct autonomy. Social interactions, appearance, weight, health pressures, and social recognition were place under the construct relatedness. The motivators may be placed under multiple constructs or possibly placed under a different construct due to perception of the motivator and personal experience.

Research Question 3 was answered using personal experience with data collection in this population from the previously approved IRB study. A spreadsheet was produced in the previous study that showed the participants completion of each survey. This was used to better understand which surveys were completed the least. The EMI-2 survey was a lengthy survey, and it did not have links to click on and fill in the choices through SurveyMonkey like the demographics and barriers survey or exercise diaries. The EMI-2 had to be filled out on the Microsoft Word document and be emailed back to the researcher. The length of the survey and lack of ease may have caused the participant to

lose interest. Consent was emailed to the researcher, and the consent had to be written by the participant. This was a challenge to receive, as participants may not have completely understood the process.

Evidence of Trustworthiness

In this section credibility, triangulation, coherence, transferability, and dependability will be addressed to include any alterations that were made during this case study. Credibility of this study had been established from the previously collected data during the planning period. The surveys were discussed and adjusted through committee suggestions to eliminate researcher bias with leading questions in the previously approved IRB study number 04-20-17-0073054. Surveys were not altered from the original study, and the questions had multiple choices for the participant to choose what best described themselves.

The EMI-2 tool was also previously established, and bias has not been reported for this tool. This tool was developed to better understand intrinsic and extrinsic motivators for physical activity based on the self-determination theory (Markland, 2014). This tool was not altered in this case study nor did researcher bias arise. Calculations were completed using the means of the groups created by David Markland. These groups are mentioned in the data analysis section as well as Appendix A. No alterations were made to any questions or groups of questions.

Triangulation was addressed by using the different sources of information from similar groups in the literature review such as the use of the EMI-2. The EMI-2 has been used in previous research to better understand motivators for the college population

(Kulavic et al., 2013). This may be used to compare the online graduate population to these previous studies. One survey in my previously approved IRB study can be used to compare physical activity levels of the 13 participants to previous research on activity levels of college students. Exercise diaries from the previously approved study may be used to better understand physical activity levels as reported by the 13 participants.

The coherence of this study was that each survey or tool fits together to create an overall picture of the 13 participant's physical activity participation and motivators. Barriers, motivators, and physical activity participation levels are all needed to create interventions or programs that may work specifically for this population. The surveys complement one another, and they create a better understanding of the 13 participants in the online graduate population. Transferability of this study could produce the same results, and similarities exist between this study and previous studies. Generalization of the population studied was not possible due to the small sample size of 13 participants. The previously approved IRB study used a convenience sample, and for future studies a randomly selected population would increase the ability to generalize. In addition, the participants in the previous study were online students, and they may live different geographical locations. This may have affected their perceived barriers due to cultural differences (Yan and Cardinal, 2013).

Dependability of the type of data collection has been previously established by committee members, and the use of this data has not been altered for this case study. Further questions were not conducted for this population. Experiences of data collection, as it applies to Research Question 3, are the views of the researcher as well as

documentation of completion of surveys by participants. Documentation within the spreadsheets was not altered from the previous study. Time lapses for data collection have not been altered, and experiences have not been altered nor viewed differently from the previous study.

Questions from the EMI-2 instrument have been previously used in studies for physical activity, and they have been reported as reliable (Kulavic et al., 2013). The EMI-2 is based on the self determination theory and supports the constructs (Markland, 2014). Demographics, perceived barriers, and exercise diaries were straight forward. Confirmability has been previously established with the design of the EMI-2 questions. Any items that were unclear for a participant, such as the EMI-2 motivation questions, they were directed to use their own interpretation. The researcher did not answer any questions for the participants or lead them in any direction from the previous study. Questions were interpreted and answered by participants only and not altered in any way.

Results

In this section, I will address the results of each research question. Research Question 1 is "What are the perceptions of physical activity barriers in this online population of graduate students?". To address this question, I have reported physical activity levels before and after the exercise diaries. I will then report the barrier data. As displayed in Figure 2, out of the 13 participants in this survey only 4 reported that they met physical activity guidelines. Eight of the participants reported that they partially meet guidelines, and only 1 reported that they did not participate in physical activity as defined by the survey question. The survey question read: "Do you currently participate in the

recommended levels of physical activity? This includes 150 minutes of moderate aerobic activity (walking, elliptical) per week and strength training (weights, squats, pushups) 2-3 times per week. Please choose the scenario that best describes the past six months."

Just for a comparison as the population surveyed was only 13 participants, the percentage of online graduate students that met physical activity guidelines in the previously approved IRB study was approximately 30 percent. As previously mentioned, in The American College Health Association's National College Health Assessment II survey, 47.4 percent of the college student populations met physical activity guidelines. (Kulavic, Hultquist, & McLester, 2013). In Table 3, the 1-week exercise diaries were reported in minutes for the week and times of strength training in one week. Some of the participants reported very high numbers of minutes for cardiovascular activity, and some reported strength training all seven days of the week. These extremely high numbers may have been due to a physical job that includes walking for hours each day and lifting items. Other assumptions may be made, but the diaries may have included the wording of "besides work". On the other hand, many people wear devices to count their steps each day, and they have made it a point to walk periodically. Those habits should be encouraged, and it may be appropriate to include these steps into their minutes of meeting guidelines. One trend that evolved during the 1-week exercise diary is that out of 13 participants, seven during that week met physical activity guidelines which correlates to 53 percent of the population studied. This may be attributed to awareness and knowledge the guidelines. This raises a question as I report of the barriers to physical activity for this population.

Table 3

One-Week Exercise Diaries

Participant	Minutes of cardiovascular activity in 1 week	Times of strength training in 1 week
Participant 1	210	0
Participant 2	191	1
Participant 3	225	4
Participant 4	75	0
Participant 5	150	5
Participant 6	575	4
Participant 7	2,040	7
Participant 8	230	3
Participant 9	970	0
Participant 10	95	1
Participant 11	161	3
Participant 12	55	4
Participant 13	210	7

Note. "From previously approved IRB study #04-20-17-0073054".

The three barriers from the previous study read: "Is the lack of a fitness facility on campus a barrier to exercise?", "Is the lack of a health/fitness course on campus a barrier to exercise?", and "Is a lack of intramural or group sports activities on campus a barrier to exercise?". The barriers will be referred to as barrier one, the lack of a fitness facility on campus, barrier two, lack of a health/fitness course on campus, and barrier 3, the lack of intramural group sports activities on campus. The frequency of the participant's answers was illustrated in Table 4. One note, barrier three had not answered by participant number 10.

Table 4

Frequency of Physical Activity Barriers

	The item is provided free of charge at work, etc.	This item does not interfere with physical activity	This item somewhat interferes with physical activity	This item interferers with physical activity
Barrier 1	4	8	1	0
Barrier 2	5	7	0	1
Barrier 3*	4	6	2	0

Note. "From previously approved IRB study #04-20-17-0073054. *For Barrier 3 one participant did not answer.

The three barrier questions from the previous study revealed that approximately 50 percent of this population did not feel that the barriers were present for physical activity. One very important trend in this data was that a quarter of this population had these items provided for them free of charge. This population was nontraditional from the characteristics of a traditional college student, and most of the participants are employed full-time. Four of the participants were either part-time or unemployed, and these items may not be as easy to access. One part-time participant reported barriers one and three as somewhat interfering with physical activity. Barrier 3 was also reported to interfere by a full-time employed participant.

One conflicting discovery when triangulating the original question of physical activity, exercise diaries, and Barrier 2 data was that the awareness of physical activity guidelines and accountability of keeping a diary increased the number of participants meeting physical activity guidelines during the one-week period. Even though only one participant said that the lack of a health course was a barrier, it does seem that awareness,

accountability, and education raise activity levels. This question may have been worded differently so that students better understood that the course may include guidelines, diaries, nutrition, and more.

Research Question 2 was used to address intrinsic and extrinsic motivators for physical activity in the online graduate population of the previously approved IRB study. The means of each category was calculated per the instructions by the EMI-2 author, David Markland. Table 5-9 illustrates these categories as previously mentioned and reflects the calculations based on Appendix A.

Table 5

EMI-2 Scoring Key for Group 1 Motivators

Participant	Stress Management	Revitalisation	Enjoyment	Challenge
1	2.25	4	2.5	1
2	4	4.33	5	3
3	5	4.66	4.25	2.75
4	2	1	0	2
5	5	5	3.5	0
6	3	4.66	5	2.5
7	2.75	4	4	4
8	4.5	4.66	4	2.5
9	3.25	2.66	3.75	3.75
10	1	1.66	3.25	0.5
11	4.5	4.33	4.5	3
12	3	3	3.25	0.25
13	3.5	3	2.5	1

Note. Calculations based on the EMI-2 Answer Key, Appendix A.

Table 6

EMI-2 Scoring Key for Group 2 Motivators

Participant	Social Recognition	Affiliation	Competition
1	0	0.75	0.25
2	2.75	1	3.25
3	0	0	1
4	0	0	0.25
5	0	0	0
6	0	0	1.75
7	0	1.75	2.75
8	0.75	1.5	1.25
9	2	3.75	4
10	0.25	0	1
11	3	0	3.25
12	0.25	0.25	0
13	0.25	0.5	0

Note. Calculations based on the EMI-2 Answer Key, Appendix A.

Table 7

EMI-2 Scoring Key for Group 3 Motivators

Participant	Health Pressures	Ill-Health Avoidance	Positive Health
1	0	2.33	4.33
2	3.33	4.67	5
3	2.33	4	4
4	1.66	3.33	3.66
5	2.66	5	5
6	1.33	3.33	5
7	1.33	4.66	5
8	4.33	5	5
9	2.33	5	5
10	0	4	4.33
11	0	4	4.66
12	1	3.66	3.66
13	1.33	1.66	3.66

Note. Calculations based on the EMI-2 Answer Key, Appendix A.

Table 8

EMI-2 Scoring Key for Group 4 Motivators

Participant	Weight Management	Appearance
1	0	0
2	4.25	3.5
3	4.5	3.25
4	4	3.5
5	1.25	3.75
6	0.75	3.5
7	5	4.75
8	5	1
9	2.75	4.75
10	4.25	2.75
11	3.75	4
12	4.75	4
13	0	1.25

Note. Calculations based on the EMI-2 Answer Key, Appendix A.

Table 9

EMI-2 Scoring Key for Group 5 Motivators

Participant	Strength &Endurance	Nimbleness
1	3.75	3
2	4	3
3	3.75	4
4	3.75	4
5	4.75	2.33
6	4	5
7	4.5	3.66
8	5	5
9	4.5	5
10	4	0
11	4.25	2.66
12	3.25	1.66
13	3.75	4.66

Note. Calculations based on the EMI-2 Answer Key, Appendix A.

The means presented in the tables above included between three to four questions chosen by the author (Markland, 2014). The range for scoring was from “0” meaning not at all true up to a “5” meaning very true. In Figure 1, the categories placed under intrinsic motivators for this study were enjoyment, challenge, ill-health avoidance, stress management, and social interactions which was worded “affiliation” in the EMI-2. The categories placed under extrinsic motivators were appearance, weight, health pressures, and social recognition. All categories were not included in the original model from Figure 1, and this was due to the ambiguity or conflicting studies. The frequency for categoric calculations was arranged in Table 10 for intrinsic motivators and Table 11 for extrinsic motivators. The ranges of frequency included 0-0.9, 1-1.9, 2-2.9, 3-3.9, 4-4.9, and 5. These ranges were created due to the decimal points created from the answer key calculation.

The intrinsic motivators in Table 10 included enjoyment, challenge, ill-health avoidance, stress management, and affiliation (social interactions). The higher the number on the zero to five scale in the EMI-2 correlated to a higher value placed on the motivator. In the enjoyment, ill-health avoidance, and stress management categories more participants placed this at a higher value than affiliation and challenge. Affiliation did not appear to be of importance to this group of participants. In Table 11, the extrinsic motivators of higher value were appearance and weight management. Most of the participants did not place a high value on health pressures and social recognition.

Table 10

Frequency of Scores for Intrinsic Motivators

Motivator	0-0.9	1-1.9	2-2.9	3-3.9	4-4.9	5
Enjoyment	1	0	2	4	4	2
Challenge	3	2	4	3	1	0
Ill-Health	0	1	1	3	5	3
Stress M.	0	1	3	4	3	2
Affiliation	9	3	0	1	0	0

Note. Based on Calculations from Appendix A and Categories from Figure 1.

Table 11

Frequency of Scores for Extrinsic Motivators

Motivator	0-0.9	1-1.9	2-2.9	3-3.9	4-4.9	5
Appearance	1	2	1	5	4	0
Weight	3	1	1	1	5	2
Health Pre.	3	5	3	1	1	0
Social Rec.	10	0	2	1	0	0

Note. Based on Calculations from Appendix A and Categories from Figure 1.

Each category in Table 10 and 11 was place in a construct of the self-determination theory. Enjoyment and stress management was placed under the first construct of competence. Both enjoyment and stress management had a frequency of higher values correlating to an overall importance in this group of participants. Challenge and ill-health avoidance were placed under the construct autonomy. Challenge appeared to be a moderate motivator, and ill-health avoidance was of higher value as a motivator. Social interactions (affiliation), appearance, weight, health pressures, and social recognition were placed under the construct relatedness. Based on the frequencies of this group of participants both affiliation and social recognition was of low

importance, and therefore it could not be considered a motivator for this group of online graduate students. Appearance and weight management had higher frequencies of scores between 3 and 5, placing these two as a priority than many other motivators. Health pressures received lower scores indicating that it is not as much of a motivator for this group.

I use Research Question 3 to address the difficulties in collecting data from online graduate students. During the previously IRB approved study, a spreadsheet was kept to account for completed surveys. This categorized items that were missing from each participant. The notification of this survey was placed on the online participant pool from April 2017 through November 2018, and the original IRB approved study is number 04-20-17-0073054. The consent/letter of invitation instructed students to email consent to the researcher in order to receive links to the demographic and barriers survey and exercise diaries for 1 week. These links led them to SurveyMonkey where the surveys were located. These were very short surveys, and they did not require mor than 5 minutes to answer. In addition to the surveys, the email included the EMI-2 instrument in Microsoft Word format. The EMI-2 was a 51 item/question survey for motivators. This survey was more time consuming, and it was required to be emailed back. It was kept in this format to not alter any of the items as approved use was obtained from the author.

The first obstacle that arose in this study was participants not reading the instructions provided on the online participant pool and not emailing consent. There was a messaging system utilized by the researcher to periodically send a message to all students signed up. This email asked the participants to send consent to the researcher's

student email address for Walden. The address was included in the message. Although the numbers were not large enough for a predicted quantitative study, there were many sign ups that could not be used due to the lack of consent.

The second obstacle was to have all participants that did send consent to complete all surveys. The original spreadsheet for the previous study categorized the surveys, and it was a documentation tool to check off completed portions of the study. This case study included the 13 participants that completed all surveys and sent consent. The spreadsheet had 24 students listed, but one student signed up twice. This left 23 students that were to complete all surveys. Out of the 23 students, 10 were missing completion of different surveys.

Out of the demographics and barriers survey, 1-week exercise diaries, and the EMI-2 instrument, the 1-week diaries and the EMI-2 were filled out the least. Six students out of the 23 did not complete the demographics and barriers survey. Eight out of the 23 did not complete the EMI-2 and return to the researcher, and eight out of the 23 did not complete the 1-week exercise diary. The diary had entries for each day of the week. Students were to click on the link for that day and complete. There were a few out of the 13 participants used in this survey that missed a day, but these were treated as zero minutes of cardiovascular activity and no strength training for the day.

One possibility for the lack of EMI-2 completion was that it was not a computerized survey. The instrument had 51 questions, and the participant could circle, highlight, underline, or make their choice clear on the Word document and email back. This may have been time consuming, and since it was not in a user-friendly format like

SurveyMonkey, this survey may have been avoided and cause the participant to lose interest. The EMI-2 instrument may be easier to administrate in person, and the survey could be handed out on paper with a writing utensil. This would make the process much easier on the participant.

The exercise diaries may have been unappealing to the participant, because this survey required a commitment of an entire week of entering physical activity. Eight participants from the original study documented in the spreadsheet did not complete any days in the exercise diary. One assumption of why the most filled out survey was the demographic and barriers survey could be that participants thought the survey was over after this completion. This assumption comes from the reminders to the participants that had sent consent. Once consent was sent, the links to surveys and EMI-2 were emailed back to the participants. Reminders would be sent to these participants on which was not completed. Some participants thought that they had completed everything, but when checked, they still had incompletes. There seemed to be somewhat of a barrier for explanations and expectations. This may have been due to the method of communication being only online.

The previously approved study was conducted only online, and this may have been the most impactful barrier due to the lack of inability to communicate in person. When conducting surveys online, clarity may need to be expressed differently than what one would do in person. The original introduction page that participants read on the online participant pool site could have been simplified using bullet points. After participants signed up and consent was received, the email sent back to the participants

could have been modified. Some changes that may have encouraged more participation would be a bullet pointed email with the expectation and link underneath.

Summary

In summary, the data from the previously IRB approved study, number 04-20-17-0073054, provided insight on perceived barriers, motivators, and possible obstacles for this type of study. The barriers included the lack of a fitness facility on campus, lack of a fitness course on campus, and lack of sports and intramural activities on campus. Except for a few participants, all three barriers had higher frequency of responses as the item is provided by work or does not interfere with physical activity. These answers may seem somewhat conflicting as only four out of the 13 participants were meeting physical activity guidelines before the survey, and after keeping the exercise diaries seven were then meeting physical activity guidelines. This may suggest that awareness and education of what physical activity levels should be are needed in online courses.

Intrinsic motivators that were most valued were enjoyment, ill-health avoidance, and stress management. Participants placed those motivators at a higher value than affiliation and challenge in the intrinsic category. Extrinsic motivators with higher value to the 13 participants were appearance and weight management. Most participants did not place value on health pressures and social recognition. Both the intrinsic and extrinsic values do support that sports and intramural activities were not a barrier to the majority in this group. As the means of each category was calculated, formula supplied by David Markland in the EMI-2, it was surprising how high of a value was placed on appearance

and weight management. Those extrinsic motivators were valued almost as much as the intrinsic motivators, and for a few participants more.

For Research Question 3, one of the challenges for studying an online population, was that surveys and correspondence are completely online. This may provide a barrier for communication. Clarity of material was very difficult to achieve, and for the previous study, the lack of participants may have been due to a lack in clarity of the study components and expectations. The previous study, in addition, may have been completed in an easier format. The EMI-2 instrument may not have been as difficult to administer in person, and a different instrument that was more simplistic could have been used for an online study. Instructions could have been delivered in a format that included bullet points with links below to make the instructions easier to read and complete.

In chapter 5, the previous studies used in the literature review will be revisited in relation to this case study. Possible interpretations will be triangulated from these previous studies and this case study. Limitations to this study will be addressed that arose. In chapter 5, recommendations will also be made for future research on all three of the research questions. Implications for social change are included to complete chapter 5.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this qualitative study was to understand physical activity barriers and motivators for the online graduate population. I also aimed to better understand challenges to collecting data in this population. The study was a qualitative case study design. The participant total was 13, and the study was conducted using online graduate students from the online participant pool from the previously IRB approved study number 04-20-17-0073054. Demographics, 1-week exercise diaries, barriers, and the EMI-2 survey for motivators were collected in the previous study.

Three research questions were addressed in the results section. They were as follows: What are the perceptions of physical activity barriers in the online graduate population, which intrinsic and extrinsic motivators are present in this population, and what are the difficulties and challenges to collecting data in this population? In the demographics survey, current physical activity levels were reported for the 13 participants, and only four met requirements. The 1-week exercise diaries increased those meeting guidelines to seven out of the 13 participants for that week time period. For Barrier 1, lack of a fitness facility on campus, only one participant chose that it somewhat interfered. The most common answers were that it was provided or did not interfere. For Barrier 2, lack of a health/fitness course, only one participant said that it did interfere. The most common answers were that it was provided at work or free of charge and it did not interfere. For Barrier 3, lack of intramural sports activities on campus, only two

participants said that it somewhat interfered. The answers for the majority were again that the item was provided or did not interfere.

Research Question 2 used the EMI-2 survey for intrinsic and extrinsic motivators for physical activity. For the intrinsic motivators, enjoyment, ill-health avoidance, and stress management had higher value placed on them by the participants. Challenge could be considered a moderate motivator, but affiliation was scored as a lower motivator by most of the participants. The extrinsic motivators that were scored as more valuable were appearance and weight. Health pressures and social recognition were scored with lower values for most participants.

Research Question 3 was to better understand the difficulties collecting data in this population. The previously approved IRB study used data collected only online, not in person. This may have been a challenge of the study, as the EMI-2 survey was lengthy and required them to fill it out an email back. This type of survey may have been easier to administer in person. The first obstacle encountered was obtaining consent. Directions were explained on the online participant pool, and the participant had to email the researcher that they consented to the study. Many sign-ups did not email consent.

Once the consent was received, the participant was emailed links to the surveys, including the demographics and barrier survey and the 1-week daily exercise entries. These were conducted through SurveyMonkey. A Microsoft Word document with the EMI-2 survey was also attached for them to fill out and return by email. The second obstacle was for participants to complete all surveys. The most completed survey of those on the original participant list of 23 students who consented was the demographics and

barriers survey. The least completed were the exercise entries and the EMI-2. As previously mentioned, the EMI-2 was a lengthier survey and may be best used in person. This narrowed the 23 participants down to 13 participants. Reminders were sent for consent and completion of surveys. The time frame of data collection was approximately 1.5 years. It is quite possible that too many surveys were used, and the previous study could have required less time and commitment from the participants.

Interpretation of the Findings

Previous studies have shown that the nontraditional college student is increasing in number. Especially online graduate students, who could be considered nontraditional due to age and their remote location for school, have not been well defined as to what the barriers and motivators are for them. From a previous study, barriers significantly higher among nontraditional students were fearing injury, lacking skill, and lacking resources (Kulavic et al., 2013). For this case study, barriers were a lack of a fitness facility on campus, lack of a health/fitness course on campus, and lack of intramural sports/activities on campus. These barriers were similar as what was previously found. As findings revealed from this case study, only around 10% or less found that the barriers somewhat interfered or interfered with physical activity. Many of the participants were ages 35 to 54, and this may have been different from the previous study.

Approximately 30% of the participants did choose the answer that the item for physical activity was provided free, whether at work or elsewhere for each barrier. The use of fitness applications has increased over the years. Certain groups in one study downloaded an app to support a behavior or to begin a new behavior (Gowin et al.,

2015). Many fitness apps are free of charge or not costly, and they can be easily navigated for those familiar with technology, which an online student would most likely be. The apps may be used for physical activity or diet. A few of the participants in this study had very high numbers of cardiovascular activity, and this may be due to having an active job where one is walking for hours in the day. One assumption could be that a participant chose that a fitness facility is provided at work free of charge because they are walking miles in a day. It may be true that the online graduate student has found a place to exercise and could download an application to assist with health or fitness education of tracking.

The barrier lack of intramural sports/activities may not be considered an obstacle for most participants in this group. The EMI-2 confirmed that this may not be a barrier due to the motivator of affiliation. This motivator series was scored low on the *not true for me* to the *true for me* Likert scale. Two participants felt that this item somewhat interfered and they may be more likely to participate in activities if they were in a group. In studying a group of participants this small, it is important to point out that there are many differences between each participant. This may also indicate that programs to address increasing physical activity for this population must be diverse as not all students are motivated or perceive barriers the same way.

Another finding of this study was that nine participants did not meet physical activity guidelines before the study. After the participants kept a 1-week exercise diary and were made aware of guidelines, only six did not meet guidelines that week. It could be assumed that the participants needed a refresher as to what the physical activity

guidelines are, and they had to be aware and accountable for the amount they exercised that week. It is possible that recording physical activity in an application may not be enough but that someone else must also see what was entered. This concept could be ideal for online classrooms and may be incorporated as an exercise buddy for the term.

From the literature review, Kulavic et al. (2013) found that motivators for the traditional student included challenge, social recognition, and affiliation, and they found that in nontraditional students, motivators were more from health pressures and ill-health avoidance. From this case study, all students were defined as nontraditional, and the findings were somewhat consistent. Social recognition and affiliation were not considered high motivators for this group. Most scores were *not true for me* for these categories. Challenge may be considered a moderate motivator for this group as most scores were low to moderate on the Likert scale. Health pressures was a low to moderate motivator, but ill-health avoidance was moderate to high on the Likert scale. Not all motivators were consistent with previous studies, but most of them were like previous findings, supporting a somewhat consistent theme.

In this study, SDT was the theoretical framework, and Friederichs et al. (2015) also used this theory in their study to understand motivators for physical activity. Their age group was very similar to this study in that their average age of participant was 44. They concluded with three motivational clusters of exercise: a low motivational cluster, a controlled cluster, and autonomous cluster (Friederichs et al., 2015). They found that the autonomous cluster produced the most favorable behavior towards exercise (Friederichs et al., 2015). This emphasizes the importance of the autonomy construct in physical

activity participation. In the results section, each construct had a set of motivators under each, and this is also displayed in Figure 1.

From the motivators in Table 10 and 11, each was placed in a construct of the SDT. This is illustrated in Figure 1. Enjoyment and stress management were placed under the construct competence. Both enjoyment and stress management were of higher value to the group of participants. Challenge and ill-health avoidance were placed under autonomy. Challenge was a moderate motivator, and ill-health avoidance was a held as a higher motivator. Social interactions (affiliation), appearance, weight, health pressures, and social recognition were placed under relatedness. Affiliation and social recognition were weaker motivators, and therefore could not be considered a motivator for this group of online graduate students. Appearance and weight management had higher values and were considered a stronger motivator for the participants. Health pressures received lower scores and may be a weak motivator for this group. Some of the findings were consistent with previous studies, but under each construct, at least one motivator was important to the group.

With the findings of this study, it seems that all aspects of SDT need to be included in programs to encourage physical activity for an online population. Individual based programs along with small group activities for accountability may be ideal for the online graduate population based on motivators and exercise diaries reported from the previously approved IRB study. Appearance and weight being strong motivators for this group of participants may enhance the need to see physical results in a time frame dictated by the individual. The perception of barriers and motivators from this case study

can be used to determine components of a health and wellness program for online students, but the need to conduct further research in larger numbers should take precedence of program development.

As Research Question 3 was addressed in the results section, one of the stumbling blocks was that the consent, surveys, and all communication were done online from the previous study. For this type of study with online graduate students, a more simplistic approach may have been needed for online surveys and consent. First, the information placed on the online participant pool could have been presented in a step-by-step format using bullet points. It is possible that the participant who registered but did not consent did not read the entire instructions. Even though reminders were sent out to email "I consent," the participants who did not consent may not have understood the process. It is possible that an attachment for a consent document could have been placed under the instructions that could have been emailed to the researcher.

The demographic/barrier survey was the most completed survey by consenting participants. The 1-week exercise diary and the EMI-2 were the least completed. It is possible that there were too many surveys. The diary may have been a commitment that some of the participants did not want to participate in. The EMI-2 was a lengthy survey, and it had to be completed and emailed back to the researcher. This tool might have been one to be completed in person. The omission of the exercise diaries and EMI-2 would have increased the participant number from 13 to 19, and this number was still very low. This solution may not be the answer, but I may have narrowed down to a more simplistic and shorter format such as one survey to keep participants through to completion.

Many more participants signed up, but they did not consent which could mean that the instructions were not clear to participants. The Typeform (2020) website suggested five components: organization, goal, how much time is needed, privacy statement, and instructions. The components to the instructions could have been written in a short summary using bullet points or numbered in place of the larger paragraph written for the students who were participating. The format may have been confusing, and the participants may not have known what to expect. Clear concise statements numbered may have provided a step-by-step list, so that they knew what was expected. With improved instructions and less surveys, more participants may have been willing to follow the survey to completion.

Limitations of the Study

As previously stated in Chapter 1, the case study method provides a limited idea about the research questions in this study. One major limitation from the previously IRB approved study was that the percentages comparing physical activity from the literature are undergraduate and graduate students, in this study there were only graduate students (Kulavic et al., 2013). This case study does not provide a generalizable analysis of activity levels of the online graduate population due to the size of the participants which was 13 in total. In order to make this generalizable, a larger study needs to be conducted and the sample needs to be random. This study can only report the answers of the 13 participants.

The 1-week diaries that were collected for activity are as well not generalizable due to the convenience sample and the size. The increase in meeting physical activity

levels as the diaries were being conducted may have been a phenomenon of this sample. This may not occur in a larger randomized sample. The findings of this study were limited to this study, and they would need to be replicated with a larger online graduate population. This would apply to the barriers and motivators findings. Those results would again be limited to this case study and would not be generalizable due to sampling size and type. Although similar findings are found in previous research with a larger and slightly different population, the limitations of this study were acknowledged for the online graduate population.

Recall bias could have been a factor when participants were asked to recall whether they are currently meeting physical activity requirements in the demographics/barrier survey. The participants may not have documented physical activity and may think that they are currently meeting but are not. Recall and response bias may have been present when the participants reported how much they exercised each day during the week. Timely entries were completed, and any entries not completed were documented as “0” minutes of cardiovascular activity and no strength training session. Some entries were in extreme numbers for cardiovascular minutes on each day. This may be due to an active job in which one may walk hours in a day, but there was not anything in the diary for the participant to clarify these numbers. In the future, the diary could include minutes of cardiovascular activity, type, location. This would assist in supporting or defending such large number reported.

Time to collect the data was also a limitation to the previously approved IRB study. The previous study was conducted as a part of an online doctoral degree which

does have time limitations for program progression. The survey was placed on the online participant pool for approximately one and a half years. During this time only 13 students completed the consent and all surveys. As previously mentioned, clarification of instructions may have increased consent, and simplifying the survey time and numbers could have increased the number of qualified participants. To achieve the quantity of participants needed for the original quantitative study, more time and modifications would have been required. Survey collection could have exceeded time and monetary resources needed to finish the study.

The survey was provided online, and the participants remained anonymous during this study. Numbers were assigned to each participant to remove any identifying factors. This practice may have reduced some bias due to the anonymity. Participants were encouraged to answer all questions on their own with no interpretation from the researcher. They were instructed to interpret questions on their own.

In summary, the type of sample and the sample size provides a limitation to this case study. The results were not generalizable to a larger population due to these factors. Clarification of surveys may have provided more insight to the one-week exercise diary. Time limitations due to the doctoral program and monetary support were present in this study. Recall bias may have been present with expressing their current level of physical activity but was limited in the exercise diary as “0” was used for non-entries. The participants were all kept anonymous in this survey, and identifying factors are not present for the results.

Recommendations

This case study was a very limited study due to the participant size. Future studies are needed that include random sampling and a larger participant size. Quantitative studies should be conducted in the future to find statistical significance for extrinsic and intrinsic motivators as well as barriers to physical activity. The current level of physical activity participation among online graduate students reported in this study was lower compared to previous studies (Kulavic et al., 2013). This is alarming as online students do not have the fitness and nutrition resources that many traditional schools may offer. For instance, an online graduate student may not enroll in an aerobics or scuba diving course. They may also not have the ability to take a general nutrition course.

These limitations may not only affect online graduate students, but it may also affect online undergraduate students. The online undergraduate population should as well be included in further research, and this may reveal a general need to incorporate some of these health classes into an online curriculum regardless of traditional and nontraditional status. Exercise diaries should be kept for future studies to assess how awareness and accountability may improve exercise levels. Clarity to the diaries should be improved upon based on the results of this study. Excessive numbers of minutes of cardiovascular activity were reported by at least two participants. Many explanations could be given such as a job that includes walking hours a day or training for a marathon. An explanation or description of the activity would have been useful for these few participants.

The last recommendation for future studies would be a modification to the approach to conducting online surveys with this type of student. Due to the lack of ability to conduct "in person" surveys, the process should be made more streamlined and simplistic to follow. Instructions and explanations for the study and consent should be illustrated in numbered or bullet point items and not paragraphs. Surveys should be streamlined and easy to complete. The surveys should all be able to be completed in a short time frame and able to complete electronically. These are the recommendations for future research for physical activity motivators and barriers to online undergraduate and graduate students.

Implications

There are many implications from this case study. Although the participant size is small, many characteristics for the online graduate student population should be explored in more detail, and a program to increase physical activity in such an online setting should be developed for the future. This would also include online undergraduate students that also do not have the same access to courses as a traditional student would. As the online student population increases, a need for a health educational and promotional programs increases as well.

Health education has been defined many ways, but planning, preparing, and influencing a healthy behavior are essential parts to an education plan (Sharma, 2017). Health education can be conducted at an organizational level which would benefit each online student, and a positive social change could take place at the college/university to encourage continuing or increasing physical activity. Health promotion can encourage

each online student to participate in a healthy behavior with educational classes, university support through resources available through campus, and partnerships with fitness organizations. Networking can be an essential component of health promotion (Sharma, 2017). We are in the day and age where social networking has become a part of our lives through applications on phones and computers. These platforms can be taken advantage of by colleges to create a means of sending educational information to their students.

From this case study, extrinsic and intrinsic motivators were identified for the 13 participants. How the participants felt about the barriers that were asked in the survey were reported. Although the participant number was 13, meeting physical activity guidelines was extremely low among this population. That could mean that the emphasis or reminder of how important this healthy behavior is very important to this type of student. This was shown in the increase in activity for their 1-week exercise diary.

Many theoretical frameworks could have been chosen for this study, but the self-determination theory was used based on previous research for physical activity. The three constructs of SDT are autonomy, relatedness, and competence (Deci & Ryan, 1980). The EMI-2 instrument used in the previously approved IRB study was based on the self-determination theory (Markland, 2014). The results from this case study supports that each construct was important in starting or changing this health behavior. Each construct should be incorporated into a health program with the emphasis on the higher motivators for physical activity.

Under the construct autonomy, challenge and ill-health avoidance were categorized. Ill-health avoidance was valued highly as a motivator for physical activity, and challenge was a moderate motivator. With this population, the benefits of physical activity and avoidance of chronic diseases should be incorporated into an education program. As this participant size was small, in larger numbers a challenge to each individual student may be a motivator for some. As previously learned from this population, affiliation or social interactions were not as important, and this could indicate that the challenge must directed for the individual independently and not in a team.

Relatedness was the next construct to be addressed from the self-determination theory. In this case study from Figure 1, social interactions or affiliation, appearance, weight, health pressures, and social recognition were under the construct relatedness. Affiliation and social recognition were of low importance, and these could not be considered a strong motivator for this group of online graduate students. This could be somewhat challenging to incorporate into health programs for online students. This does not mean that certain individuals from this group benefit from affiliation, but the need may not be present in a school setting. This may be accomplished in an out of school setting such as work, church, and fitness facilities like recreation centers in the community. Appearance and weight management were considered stronger motivators for this participant group under the construct relatedness. Programs should incorporate these motivators in their health program. This may be done a variety of ways, but the online student should understand that a healthier appearance and healthier weight are products of a more active lifestyle. Lastly, health pressures were not a strong motivator

for this participant group. The motivators indicate that positive reinforcement must be present, but that the individual must decide how much of a benefit the behavior change is to them.

The final construct of competence included enjoyment and stress management from Figure 1. Enjoyment and stress management were both shown to be of higher importance to this group meaning that they were stronger motivators. This group of students were nontraditional students and responsibilities outside of school vary. The responsibility load of a nontraditional student is thought to be greater, but there are exceptions to each category. Considering the possible responsibilities for this online graduate group, enjoyment and stress management would be an essential part of a health program to increase physical activity. Receiving the benefits from exercise is very much needed in a fast-paced lifestyle. Programs could include education on certain physical activity practices such as yoga and meditation that target stress and provide enjoyment to the participant.

Implications for Positive Social Change

Recommendations for implementing a positive social change for the online graduate student population would be to use a strong theoretical based model, such as SDT, for a program designed to increase physical activity among this population. Understanding the responsibilities, values, and cultural differences in such a varied population is important for a successful program. Using the approach of basing a program on strong motivators for this population can help the success of a program. Understanding what barriers may be perceived can help remove them for the student.

Perceived barriers should be studied further for this population as responsibilities may be their biggest barrier. This population seemed likely to have resources as far as a location to work out or a friend or group to work out with based on this study. Access to resources such as applications and various websites seemed to be prevalent based on the frequency of barrier responses to education. Even though educational classes were not perceived as barriers to most of this group, it does seem that based on the exercise diaries, a reminder of what physical activity guidelines were and accountability influenced participants to meet guidelines for that week. In summary, a strong theoretical model, incorporation of strong motivators, understanding barriers, and accountability can provide a starting point for health programs for this population.

Lastly to be addressed is the design of online surveys directed towards an audience such as the online graduate student. One of the disadvantages was that you do not see the participant face-to-face for clarity or instruction. This means that all instructions must be clear and concise. From the previously IRB approved study, as mentioned previously, the consent and instructions are very lengthy. It is possible that by the end, when they were instructed to email their consent, they had lost focus and interest. This detail of emailing consent should have been listed first, and then the least important information at the bottom. This would be essential for successful surveys leading to successful studies involved in making a positive social impact.

Conclusion

In conclusion this case study was a very limited study due to small sample size, but this study did give direction for larger studies and a possible basis for health

programs targeted to online graduate students. The findings from this study were similar to larger studies that have included traditional and nontraditional students (Kulavic et al., 2013). Those similarities were prevalent for the motivators in this group of students and previous groups studied (Kulavic et al., 2013). Although most of the participants in this study did not feel that the barriers presented in the survey were true for them, barriers in this online population should be explored further for identification. Barriers obviously exist in this population as only four out of the 13 participants reported that they were meeting physical activity guidelines.

Although the sample is small, those meeting physical activity guidelines were below what has been previously reported for a larger group of traditional and nontraditional students. The exercise diaries collected from the previously approved study reported an increase in those meeting physical activity requirements for that week. The number increased to 7 out of the 13 meeting guidelines during their 1-week exercise diary. This may indicate that, even though the students may not perceive that they need a health course, they may need a reminder of guidelines frequently and a way to be accountable. There are many types of online websites and applications that have information on physical activity (ODPHP, 2016). It is quite possible that a health program directed towards this population may need to have a compilation of websites and applications for the student's use.

The self determination theory is a possible theory to base health programs upon. Those programs could be targeted based on the stronger motivators for this population under each construct. The compilation of applications and websites should support these

constructs as well. Being that appearance and weight were important to this participant group, health programs should be goal oriented for participants to see results. Affiliation was not as important to this population, so goal-oriented challenges should be individualized and not constructed as a team. Competition was a low to moderate motivator and may not be appropriate to include in programs for this population.

Surveys for the online population should be easy and not time-consuming to fill out. Instructions should be clear and concise, and bullet points or numbering should be used to simplify the process into steps. The most important portions of the instructions should be put at the top of the letters of invitation and consent information. The inability to have the participant in a face-to-face setting may be challenging. Much thought should go into an online study design.

There were limitations to this study due to the sample size and type. A randomized sample with a larger participant size would be ideal for future studies. A larger random sample of online students could make future studies generalizable unlike a smaller study. Recall bias may have been a factor when reporting if the individual currently met physical activity guidelines. Even though the lack of generalizability exists, along with the other limitations, this study is hopefully the beginning of future research for an ever-growing online student population. The need to better understand how to improve the overall health of the online student and incorporate health programs initiating or continuing physical activity is greatly needed. I do hope this study will inspire future studies.

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Appendix A: EMI-2 Instrument and Key

The Exercise Motivations Inventory - 2 (EMI-2)

On the following pages are a number of statements concerning the reasons people often give when asked why they exercise. *Whether you currently exercise regularly or not,* please read each statement carefully and indicate, by circling the appropriate number, whether or not each statement *is true* for you personally, *or would be true* for you personally if you did exercise. If you do not consider a statement to be true for you at all, circle the '0'. If you think that a statement is very true for you indeed, circle the '5'. If you think that a statement is partly true for you, then circle the '1', '2', '3' or '4', according to how strongly you feel that it reflects why you exercise or might exercise.

Remember, we want to know why *you personally* choose to exercise or might choose to exercise, not whether you think the statements are good reasons for *anybody* to exercise.

It helps us to have basic personal information about those who complete this questionnaire. We would be grateful for the following information:

Your age …… years **Your gender ……**
male/female

		Not at all true for me					**Very true for me**
Personally, I exercise (or might exercise) …							
1	To stay slim	0	1	2	3	4	5
2	To avoid ill-health	0	1	2	3	4	5
3	Because it makes me feel good	0	1	2	3	4	5

4	To help me look younger	0	1	2	3	4	5
5	To show my worth to others	0	1	2	3	4	5
6	To give me space to think	0	1	2	3	4	5
	Personally, I exercise (or might exercise) …	**Not at all true for me**					**Very true for me**
7	To have a healthy body	0	1	2	3	4	5
8	To build up my strength	0	1	2	3	4	5
9	Because I enjoy the feeling of exerting myself	0	1	2	3	4	5
10	To spend time with friends	0	1	2	3	4	5
11	Because my doctor advised me to exercise	0	1	2	3	4	5
12	Because I like trying to win in physical activities	0	1	2	3	4	5
13	To stay/become more agile	0	1	2	3	4	5
14	To give me goals to work towards	0	1	2	3	4	5
15	To lose weight	0	1	2	3	4	5
16	To prevent health problems	0	1	2	3	4	5
17	Because I find exercise invigorating	0	1	2	3	4	5
18	To have a good body	0	1	2	3	4	5
19	To compare my abilities with	0	1	2	3	4	5

other peoples'

20	Because it helps to reduce tension	0	1	2	3	4	5
21	Because I want to maintain good health	0	1	2	3	4	5
22	To increase my endurance	0	1	2	3	4	5
23	Because I find exercising satisfying in and of itself	0	1	2	3	4	5
		Not at all true for me					**Very true for me**
Personally, I exercise (or might exercise) …							
24	To enjoy the social aspects of exercising	0	1	2	3	4	5
25	To help prevent an illness that runs in my family	0	1	2	3	4	5
26	Because I enjoy competing	0	1	2	3	4	5
27	To maintain flexibility	0	1	2	3	4	5
28	To give me personal challenges to face	0	1	2	3	4	5
29	To help control my weight	0	1	2	3	4	5
30	To avoid heart disease	0	1	2	3	4	5
31	To recharge my batteries	0	1	2	3	4	5
32	To improve my appearance	0	1	2	3	4	5
33	To gain recognition for my accomplishments	0	1	2	3	4	5

34	To help manage stress	0	1	2	3	4	5
35	To feel more healthy	0	1	2	3	4	5
36	To get stronger	0	1	2	3	4	5
37	For enjoyment of the experience of exercising	0	1	2	3	4	5
38	To have fun being active with other people	0	1	2	3	4	5

Please Turn Over

		Not at all true for me					**Very true for me**
Personally, I exercise (or might exercise) …							
39	To help recover from an illness/injury	0	1	2	3	4	5
40	Because I enjoy physical competition	0	1	2	3	4	5
41	To stay/become flexible	0	1	2	3	4	5
42	To develop personal skills	0	1	2	3	4	5
43	Because exercise helps me to burn calories	0	1	2	3	4	5
44	To look more attractive	0	1	2	3	4	5
45	To accomplish things that others are incapable of	0	1	2	3	4	5
46	To release tension	0	1	2	3	4	5

47	To develop my muscles	0	1	2	3	4	5
48	Because I feel at my best when exercising	0	1	2	3	4	5
49	To make new friends	0	1	2	3	4	5
50	Because I find physical activities fun, especially when competition is involved	0	1	2	3	4	5
51	To measure myself against personal standards	0	1	2	3	4	5

Thank you for completing this questionnaire

David Markland
SSHES, University of Wales, Bangor
January 1997

The Exercise Motivations Inventory - 2 (EMI-2)

Scoring Key

Scale scores are obtained by calculating means of the appropriate items

Scale	Items			
Stress Management	**6**	**20**	**34**	**46**
Revitalisation	**3**	**17**	**31**	
Enjoyment	**9**	**23**	**37**	**48**
Challenge	**14**	**28**	**42**	**51**
Social Recognition	**5**	**19**	**33**	**45**
Affiliation	**10**	**24**	**38**	**49**
Competition	**12**	**26**	**40**	**50**
Health Pressures	**11**	**25**	**39**	
Ill-Health Avoidance	**2**	**16**	**30**	
Positive Health	**7**	**21**	**35**	
Weight Management	**1**	**15**	**29**	**43**
Appearance	**4**	**18**	**32**	**44**
Strength & Endurance	**8**	**22**	**36**	**47**

13 27 41

Nimbleness

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=

David Markland <XXX@bangor.ac.uk> 7/3/15

to me

Dear Gloria,
You are welcome to use the EMI-2. Good luck with your dissertation.
David Markland

David Markland, PhD, CPsychol

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Exercise motivation measurement website:

http://www.bangor.ac.uk/~pes004/exercise_motivation/scales.htm

Appendix B: Demographics and Barriers Survey on SurveyMonkey

Demographic and Barriers Survey

Please answer all questions.

1. What is your gender?

- Female
- Male
- Prefer not to indicate

2. What is your age?

- 18 to 24
- 25 to 34
- 35 to 44
- 45 to 54
- 55 to 64
- 65 or older

3. Which program are you enrolled in?

- Master's level
- Doctoral level

4. Are you currently enrolled as a student?

- Yes, full time in graduate school
- Yes, part time in graduate school

5. Which of the following categories best describes your employment status?

- Employed, working full-time
- Employed, working part-time
- Self-employed, full-time
- Self-employed, part-time
- Unemployed

6. What is your ethnicity? (Please select all that apply.)

- American Indian or Alaskan Native
- Asian
- Black or African American
- Hispanic or Latino
- White / Caucasian
- Not Hispanic or Latino

- [ ] Native Hawaiian or Pacific Islander
- [ ] Prefer not to indicate

7. Which of the following best describes your current relationship status?

- ○ Married
- ○ Widowed
- ○ Divorced
- ○ Separated
- ○ Single, but cohabiting with a significant other
- ○ Single, never married

8. How many numbers of dependents live in your home?

- ○ 0
- ○ 1-2
- ○ 3-4
- ○ 5-7
- ○ 8-10

9. Do you currently participate in the recommended levels of physical activity? This includes 150 minutes of moderate aerobic activity (walking, elliptical) per week and strength training (weights, squats, pushups) 2-3 times per week. Please choose the scenario that best describes the past six months.

- ○ Meets exercise guidelines each week
- ○ Partially meets exercise guidelines each week (Aerobic or Strength)
- ○ Does not meet exercise guidelines but exercises some
- ○ Does not participate in physical activity

10. Is the lack of a fitness facility on campus a barrier to exercise?

- ○ The item is provided free of charge at work, etc.
- ○ The item does not interfere with physical activity
- ○ The item somewhat interferes with physical activity
- ○ The item interferes with physical activity

11. Is the lack of a health/fitness course on campus a barrier to exercise?

- ○ The item is provided free of charge at work, etc.
- ○ The item does not interfere with physical activity
- ○ The item somewhat interferes with physical activity
- ○ The item interferes with physical activity

12. Is a lack of intramural or group sports activities on campus a barrier to exercise?

- The item is provided free of charge at work, etc.
- The item does not interfere with physical activity
- The item somewhat interferes with physical activity
- The item interferes with physical activity

13. Please provide your name and email

Done

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Appendix C: Sample Exercise Diary on SurveyMonkey

Monday Exercise Diary

Monday Diary

Please fill out completely

1. How many minutes of at least moderate cardiovascular activity did you perform today? Examples include elliptical, brisk walk, light jogging.

2. Did you perform strength training exercises today?

- yes
- no

3. Please enter your name and email.

Done

<style type="text/css" media="all">form {display:none;} </style><div style="text-align:center;">Javascript is required for this site to function, please enable.</div>