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The effect of Physical Activity on the Mental Health of Pre-Nursing Students and Undergraduate Student Nurses

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Abstract

Mental health concerns are on the rise among the college-aged student. College students face a great deal of stress, which can lead to depression and anxiety. Nursing students, as a sub-group of college students, are under even greater stress related to rigorous course work and the responsibility of caring for other people, which can lead to greater depression and anxiety. This study aimed to determine what effect, if any, physical activity has on depression and anxiety scores using the PHQ-9 and GAD-7 instruments in pre-nursing and nursing students. In this study, physical activity is defined as is "any bodily movement produced by skeletal muscles that requires energy expenditure-including activities undertaken while working, playing, carrying out household chores, travelling, and engaging in recreational pursuits…: (WHO 2018).

Pre-nursing and nursing students at Union College (UC), in Lincoln, NE, were invited to participate in a 6-week quasi-experimental study. The participants completed a survey that included the Patient Health Questionnaire (PHQ-9) and the Generalized Anxiety Disorder (GAD-7) instrument; demographic information also was collected. The participants completed 30 minutes of physical activity three days a week over the 6-week period. At the conclusion of the 6 weeks, the participants repeated the PHQ-9 and the GAD-7 and answered two qualitative questions evaluating their experience.

The analysis has shown a strong correlation between physical activity and decreased depression and anxiety scores. All scores decreased and the themes in the answers to the qualitative questions showed an improvement in mental health. Future research should expand this strategy to multiple colleges and universities and include all college students.

Keywords: nursing students, physical activity, stress, depression, anxiety

Chapter 1

The Effect of Physical Activity on the Mental Health of Pre-Nursing Students and

Undergraduate Student Nurses in a Small Liberal Arts College in the Midwest

Mental health, including mental illness, is a common concern on college and university campuses worldwide. The World Health Organization (WHO) defines health as "a state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity" (Ghebreyesus, 2019). He goes on to say, "there can be no health or sustainable development without mental health." According to the WHO, depression and anxiety costs the global economy $1 trillion per year. In addition, mental health conditions cause 1 in 5 years lived with a disability and lead to 800,000 suicides a year (Ghebreyesus, 2019). "The vision of the WHO Special Initiative for Mental Health is that all people achieve the highest standard of mental health and well-being" (Ghebreyesus, 2019). Factors such as personality, cognition, and attitude affect mental health. The WHO promotes a mental health concept status beyond the absence of mental disorders. It includes "mental well-being, self-efficacy, autonomy, competence, social relations, social communication, property, and intellectual and emotional potentialities" (Sodeify et al., 2020). Strong mental health promotes a logical perception of others and is not correlated with suicidal thoughts, unprofessionalism, and burnout (Sodeify et al., 2020).

Mental health is an important issue among college students. College is a stressful time for students; it is during this time that they begin to make independent decisions. Many have left home for the first time and experience greater freedom as well as more competition in classes. Jacimovic (2021) found college students report six or more episodes of stress in the last 12 months, or once every two months. This leads to poor academic performance and mental health

challenges. In this time of transition from adolescence to young adulthood, going to college exacerbates the possibility of stress (Leal et al., 2015). In particular, incoming freshmen are under a great deal of stress. They have spent their high school years trying to achieve a good GPA while engaging in rigorous classwork, such as taking advanced placement classes, participating in extracurricular activities, and volunteering in the community to add to their admission application, yet according to the National Association for College Admission Counselors only 65.4% applicants were admitted to college in 2018 (Tarsitano, 2019).

In its Spring 2020 survey that collects data about students, the American College Health Association-National College Health Assessment (ACHA-NCHA), a nationally recognized survey that collects data on students' health habits, behaviors, and perceptions, found that 33.6% of males and 19.4% of females reported low stress levels in the last 12 months. Moderate stress levels were reported by 45% males and 51.7% females. High stress levels were reported by 17% of male students and 28% of female students (American College Health Association, 2020).

Stressors cause reactions in the physical, emotional, and/or mental well-being of individuals. According to Preto and colleagues (2018), stress leads to general adaptation syndrome (GAS), a three-phased event. The first stage is the alarm stage, in which the person moves into the fight or flight mode against the stressor. After this stage, the person can return to a state of equilibrium. The second stage is resistance. After the alarm phase, if there is still resistance, the body changes and concentrates the reaction within a single organ. The final phase is exhaustion, which results from an excess of activities.

Sixty-three percent of adults state their physical health is their number one source of stress, and 30% of students report their physical health affects their academic performance.

Ailments cited by students include bronchitis, allergies, and fever Jacimovic (2021).This is also

the time when college students can develop healthy habits that they can benefit from throughout

their lifetime. During nursing school, while students are exposed to health promoting practices,

the rigor of nursing school may cause the student to develop poor health habits (Evans et al.,

2019). Many nursing students may not be "traditional students" and may enter the program with

coexisting situations such as dependents and financial responsibilities beyond education; these

students may have poorer health habits than more traditional students (Evans et al., 2019).

In addition, college students do not get enough sleep, which is associated with poor

mental health, poor quality of life, and decreased academic performance (Zeng et al., 2019).

Forty percent report feeling well-rested on only two days a week, 50% wake to check their

phones, and only 11% report they sleep well. This leads to stress-related illnesses including

depression, anxiety, and burnout.

Healthy eating provides better energy for managing stress and burnout Jacimovic (2021).

The Standard American Diet is made up of 63% of processed food, 25% of animal-based foods,

and 12% of plant-based foods, with 6% of that made up of French fries (Forks Over Knives,

2016). The average college student does not get the recommended daily fruit and vegetable

intake. Ickes et al. (2015) found 9 out of 10 reported fewer than 5 servings per day of fruits and

vegetables.

The American College of Sports Medicine (ACSM) recommends "all healthy adults aged

18–65 years should participate in moderate intensity aerobic physical activity (PA) for a

minimum of 30 minutes, 5 days a week, or vigorous intensity aerobic activity for a minimum of

20 minutes, 3 days a week" (Riebe et al., 2018, p. 4). Miragall et al. (2017) states that about 31%

of people over the age of 15 do not get the recommended amount of weekly PA; besides lack of

time, a lack of interest or motivation is a main reason. The ACSM reports that 49.6% of college students fail to meet minimum requirements for PA, and after the high school years, there is a dramatic drop in physical activity among college students (Yan et al., 2015). There are many reported reasons college students either participate or do not participate in physical activity; these include lack of social support and self-efficacy, availability, accessibility, perceived benefits, and perceived barriers (Nahar et al., 2016). The Centers for Disease Control and Prevention (CDC) reports that getting enough PA can prevent 1 in 10 premature deaths, 1 in 8 cases of breast cancer, 1 in 8 cases of colorectal cancer,1 in 12 cases of diabetes, and 1 in 15 cases of heart disease. The CDC reports $117 billion in annual health care costs related to inadequate PA (Centers for Disease Control and Prevention, 2019). The ACHA-NCHA III Undergraduate Reference Group Data Report (Fall 2020) reported on moderate PA, including brisk walking, dancing, or household chores. The report found 3.7% of students spent 0 minutes in moderate PA, 52.3% of students spent 1–149 minutes in moderate PA, 20.9% spent 150–299 minutes in moderate PA, and 5.6% spent 300 or more minutes in moderate PA (ACHA-NCHA III Undergraduate Reference Group Data Report, Fall 2020).

During their collegiate years, college students experience many stressors. Coping or lack of coping with these stressors is a determinant of college success. The ACHA-NCHA III Fall 2020 assessment found that 17% of males and 35% of females were diagnosed with anxiety (including generalized anxiety and social anxiety), and 13.6% of males and 25.3% of females were diagnosed with depression. In addition, 10.1% males and 22.1% females reported experiencing both anxiety and depression. Of the respondents in this survey, a high percentage reported seeking some form of medical treatment within the last 12 months for anxiety; this included 63.7% of male and 76.2% of female respondents. Of those who reported seeking

treatment for depression, 69.1% were male and 75.1% were female (American College Health Association, 2020).

Suicide is the second leading cause of death in college students in part due to maladaptive coping strategies and maladaptive health behaviors such as poor sleep, imbalanced diet, and drinking (Kelliher Rabon et al., 2017). According to these researchers, risk factors for suicidal behavior include depression, depressive symptoms, poor health, and well-being. Depressive and anxiety disorders are associated with poor academic productivity, less satisfaction with quality of life, and suicidal ideation (Li et al., 2018). The ACHA-NCHA III Fall 2020 survey found that in the last 12 months (Fall 2019-Fall 2020), 2.8% males and 2.1% females had attempted suicide (ACHA-NCHA III Undergraduate Reference Group Data Report, Fall 2020).

Clark (2018) surveyed 5,000 nursing students and found the top stressors included challenging coursework, pressure to succeed, and fear of failure including worrying about harming patients. These nursing students reported an average stress score of 75.2 on a scale of 0–100. She also reported the students' average stress level decreased to 49.7 after participating in healthy coping activities. These activities included time with family and friends, physical activity, prioritizing responsibilities, and self-care. Nursing students also reported depression, alcohol use, stress, low quality of sleep, excessive daytime sleepiness, and anxiety. Nursing students report a low level of mental health and this could lead to personal and professional problems (Sodeify et al., 2020).

Keykaleh and colleagues (2018) conclude that nurses, as the health care professionals with the most direct patient contact, face many stressors in addition to the emotional burden of caring for sick patients, including long hours, communication with physicians and other health

care workers, heavy workload, dissatisfaction with salary and benefits, and holiday work requirements. These stressors may lead to burnout and can cause an increase in patient safety errors, which may have significant consequences including the potential for patient death (Keykaleh et al., 2018). Burnout leads to nurses leaving the workforce, which creates a workforce shortage, resulting in further stress on the remaining nurses (Keykaleh et al., 2018). As Zeng et al. (2019) states, "the psychological status of nursing students not only contributes to the trend of Chinese nursing graduates leaving the clinical nursing career, further increasing the shortage of nurses, but also affects the quality of future clinical nursing and patient satisfaction" (p. 807). This is happening in the United States as well. The rate at which nurses are leaving the profession is alarming. Thew (2019) found 17% of new nurses leave their first nursing job within the first year, 33% within two years, and 60% within eight years.

Kelliher Rabon et al. (2017) describe wellness as "an active process by which an individual becomes aware of and makes choices toward a more successful existence." Wellness activities include adequate sleep, exercise, healthy diet, and self-care. What protective measures can students take to prevent or treat depression and anxiety? Religion and self-care have been identified as two important components in treating depression (Klausli et al., 2018). Evidence is showing that an increase in PA can provide short-term mental health benefits such as improved self-esteem and mood and decreased anxiety and depression (Yan et al., 2015). A decrease in PA puts the college student at risk for developing chronic diseases later in life, for example, cardiovascular disease, stroke, type 2 diabetes, and breast and colon cancer (Yan et al., 2015). CDC reported (2019) that estimates from the 2018 National Health Interview Survey found 53.3% of adults aged 18 and older met the 2008 federal physical activity guidelines for aerobic

activity. This study will examine the effects an increase in PA has on depression and anxiety in undergraduate nursing students.

Problem Statement and Purpose

It is evident in the literature that stress among college students is an ongoing problem. Stress leads to anxiety and depression and ineffective coping measures, which affect a student's quality of life (Fitzgerald et al., 2015). Fewer than half of college students meet the ACSM's guidelines for either moderate or vigorous physical activity, or a combination of each and one out of four college students reported no days of moderate to vigorous activity for at least 30 minutes (Nahar et al., 2016).

There are three reasons for choosing physical activity as the intervention to aid in promoting positive mental health in students, in general, and nursing students, specifically:

1. The lack of PA "is one of the leading risk factors for death worldwide," (World Health Organization, 2018). Lack of PA is a major risk factor for noncommunicable diseases (NCD) such as cardiovascular disease, cancer, and diabetes; an increase in PA can help prevent NCDs (World Health Organization, 2018). A sedentary lifestyle may begin earlier; the WHO (2018) also reported that 80% of adolescents are not meeting minimum requirements for PA.

2. PA releases endorphins that can help with depression and anxiety Jacimovic (2021).

3. There is no pharmaceutical replacement for exercise (Egger et al., 2017), and exercise is a health-promoting activity that can be recommended by any clinician (Jonas et al., 2009).

Research Question

This project examines the effect of PA on the wellness scores of pre-nursing and nursing students in the five semesters of nursing school at Union College (UC), a small, faith-based liberal arts college in Lincoln, Nebraska. The research question asked: Does regular PA decrease the student's depression and anxiety as shown by a decrease in the score on the Patient Health Questionnaire 9 (PHQ-9) and the Generalized Anxiety Disorder (GAD-7) test (Appendix A)?

There are three hypotheses for this research study:

1. After completing the PA intervention, the student's post-intervention PHQ-9 and GAD-7 scores would be lower than their pre-PA intervention score.
2. The students who did not fully participate in the PA intervention would not demonstrate a decrease in their scores on the PHQ-9 and GAD-7.
3. The scores would not be statistically significantly different in students who did not complete the PA intervention as designed.

Timely detection of mental health problems is important so that academic performance may be maintained and healthy strategies, such as physical activity, can be promoted (Diaz-Godino et al., 2019).

Theoretical Framework

Three models were used to guide this study—the transtheoretical model of change (TTM), the Health Belief Model (HBM), and the CREATION Health model. These models identify the stages of change behavior, level of motivation to perform healthy behaviors to avoid or cure an illness, and focus on whole-person health and lifestyle change (Baysal et al., 2017,

Cummings et al., 2014, Becker, 1974). The theoretical framework joins these three models as shown in Figure 1.1 (Appendix B).

1Figure 1.1. Theoretical Framework Model
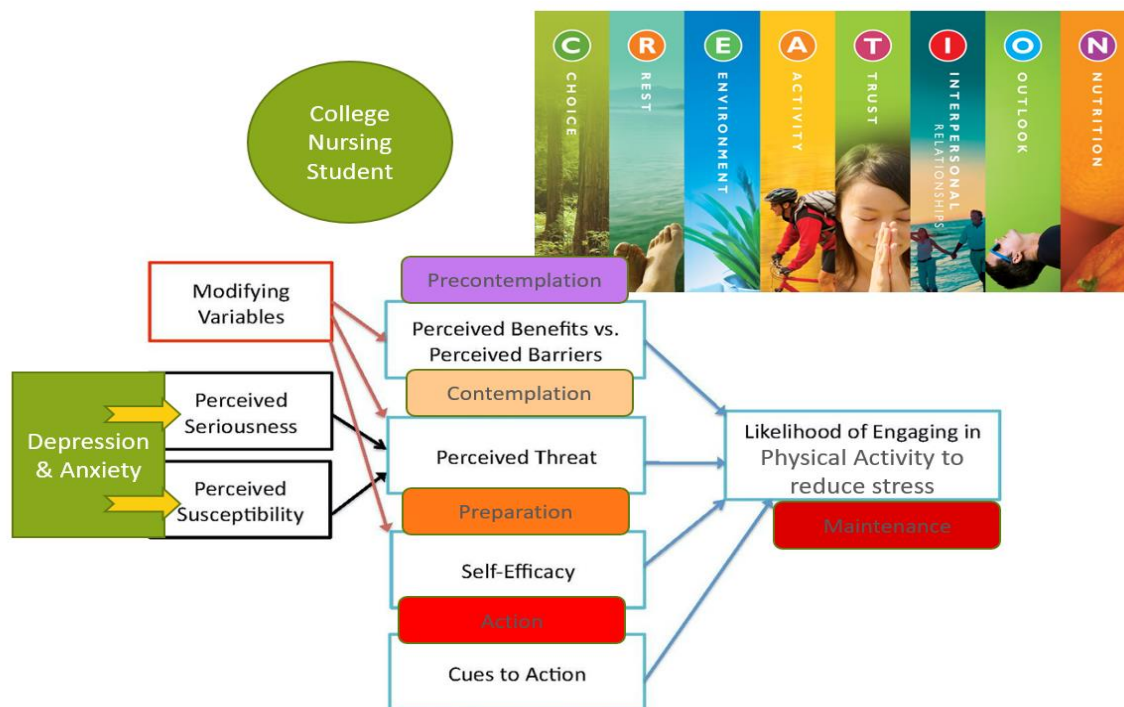
In this framework, depression and anxiety are the illness to be alleviated or cured. The pre-nursing and nursing students must recognize the seriousness of this threat, and whether they believe themselves to be susceptible to the threat of depression and anxiety. Depending on how serious this threat is perceived to be, the student may find themselves at various stages of change. The student may find the intervention of PA to be an attractive method to decrease their depression or anxiety. The HBM supports the belief that a certain health behavior—the PA intervention—will help the pre-nursing or nursing student ease the burden of depression or anxiety (LaMorte, 2019). However, the students must come to this belief themselves. If the students find themselves in the precontemplation stage of change for accepting the PA

intervention to ease depression or anxiety, then the students will not benefit from the intervention. If the students find themselves in the contemplation or preparation stages, they may benefit from the PA intervention because they are willing or prepared to make this change and will demonstrate self-efficacy (Baysal et al., 2017).

The CREATION Health model supports a holistic approach to health and promotes positive lifestyle behaviors. Engaging in these adaptive behaviors promotes physical and mental well-being. Establishing good health habits early in life can affect health later in life. The CREATION Health model supports the use of PA as an intervention for depression and stress release (Cummings et al., 2014). It is important, according to CREATION Health, to rethink activity. Rather than thinking that a workout is the only way to achieve fitness, the workout is considered to be a component of an active lifestyle in which movement is part of everyday life (Neal et al., 2014). "The greatest benefits come from raising yourself up a notch from low-fitness status to moderate fitness—going from doing nothing to doing something, even if it's just a minimum amount of activity" (Johnson et al., 2012, p. 73). Physiologically, exercise dissipates the stress hormones epinephrine and norepinephrine and raises the level of endorphins that are the body's own "uppers" (Cummings et al., 2014, p. 68). Thus, PA is an excellent intervention for the students and may be a remedy for their depression and anxiety.

Definitions

Stress

Andrew Baum (1990) defines stress as any "emotional experience accompanied by predictable biochemical, physiological and behavioral changes." Stress may also be defined as "a situation of acute or chronic tension, which produces a change in physical behavior and

emotional state, and a response of psychophysiological adaptation, which may be negative or positive in the organism" (Preto et al., 2018). Nursing students report top stressors as intense workloads related to classes and clinical experiences, assignment completion, examinations, preparing for the National Council Licensure Examination (NCLEX), juggling family and life responsibilities, and personal problems (Clark, 2018).

Depression

According to the American Psychological Association (2020) depression is more than just sadness. Depression may cause "a lack of interest and pleasure in daily activities, significant weight loss or gain, insomnia or excessive sleeping, lack of energy, inability to concentrate, feelings of worthlessness or excessive guilt, and recurrent thoughts of death or suicide" (American Psychological Association, 2020)" Depression is a common mental health concern affecting 264 million people worldwide, and it is the leading cause of disability (World Health Organization, 2020).

Anxiety

Anxiety is defined by the American Psychological Association (2020) as "an emotion characterized by feelings of tension, worried thoughts, and physical changes like increased blood pressure." People with anxiety often have recurring intrusive thoughts or concerns. They may also have physical symptoms such as "sweating, trembling, dizziness, or a rapid heart rate" (American Psychological Association, 2020). Multiple studies indicate how stress can cause depression and anxiety. The goal of this study is to determine the effects of exercise on depression and anxiety in undergraduate nursing students who experience a great amount of stress.

Physical Activity

Egger and colleagues (2017, p. 182) defines physical activity as "any musculoskeletal activity that involves significant movement of body or limbs." On the other hand, exercise is defined as "a type of physical activity defined as a planned, structured, and repetitive bodily movement done to improve or maintain physical fitness" (Egger et al., 2017, p. 182). Intentional physical activity is the focus of this study. It was found that walking is an easy way to get PA with a low psychological burden. Walking contributes to long-term behavior change and is easy to add to a person's life (Shimazaki et al., 2016).

Chapter 2

Literature Review

A literature review was conducted to examine the available information regarding the effects of PA on depression and anxiety in undergraduate student nurses. A search of CINAHL and PubMed was performed using key search terms including stress, anxiety, depression, student nurse, undergraduate student nurse, exercise, physical activity, Transtheoretical Model of Change, Health Belief Model, and CREATION Health. The dates were limited from 2015 to 2020, except for literature regarding the theoretical models.

Transtheoretical Model

The TTM is commonly used to change health behaviors, and interventions based on this model are designed to meet everyone at the stage where they are (Baysal et al., 2017). Carlo DiClemente and James Prochaska developed the TTM after working with clients who quit smoking on their own. This theory includes five stages in the change process: precontemplation, contemplation, determination, action, and maintenance. In the precontemplation stage, people do not intend to make any changes in the foreseeable future. In the contemplation stage, people plan to make a change within six months or less. In the determination stage, people are ready to act within 30 days. In the action stage, people have changed their behavior within the last 6 months. In the maintenance stage, people have maintained the change for 6 months or more and are working hard to prevent relapse. People can enter or leave a stage at any time since it is a very dynamic process (LaMorte, 2019). This model has been shown to be effective in working with people to increase their level of PA. The TTM has several mediators of change, including decisional balance, self-efficacy, and processes of change (POC) (Romain et al., 2018). The POC

include experiential POC such as consciousness raising, dramatic relief, self-reevaluation, environmental reevaluation, and social liberation. The behavioral POC includes self-liberation, helping relationships, counter conditioning, reinforcement management, and stimulus control. Romain et al. (2018) found that both experiential POC and behavioral POC increased as the participant advanced through the stages of change (SOC). The TTM lends itself to an intervention-based study.

Health Belief Model

  The Health Belief Model (HBM) has two foundations derived from health-related behaviors—the desire to avoid illness or the desire to get well and the belief that a certain action will prevent or cure the illness (Becker, 1974). The HBM suggests that health-related actions depend upon the simultaneous occurrence of three types of factors:

1. The existence of sufficient motivation to make health issues salient or relevant.
2. The belief that one is susceptible to a serious health problem (depression or anxiety) or to the sequelae of that illness or condition. This is often referred to as a perceived threat.
3. The belief that following a particular health recommendation (physical activity intervention) would be beneficial in reducing the perceived threat (depression or anxiety), and at a subjectively acceptable cost. This cost includes barriers that must be overcome and does not only include financial cost (Rosenstock et al., 1988).

  The HBM has several limitations that may affect its applicability to this study, such as the lack of accounting for a person's attitudes, beliefs, and other determinants that affect a person's ability to accept a health behavior or environmental factors that may affect the person's ability to adopt the recommendation (Becker, 1974).

CREATION Model

The CREATION Health Model comes from the Adventist Health System, now AdventHealth, in Orlando, FL. It has eight health principles founded on AdventHealth System's philosophy of "Whole Person Health " and the creation story found in Genesis. "Full health is more than the absence of disease and its symptoms; it is a moment-by-moment realization that God wants each human being on earth—people like you and me whom he loves and cares about—to have the absolute best that this life can offer" (Cummings et al., 2014, p. 12).

CREATION is an acronym for eight health principles: choice, rest, environment, activity, trust, interpersonal relationships, outlook, and nutrition. These eight principles work best in tandem with each other; however, for this study, the principle of focus is activity. Intentional exercise or activity may be the best medicine for warding off any disease and helps the body fight stress, anxiety, and depression (Cummings et al., 2014). Three of the best results from consistent exercise include stress release, depression release, and insomnia release (Cummings et al., 2014). Some studies show that exercise performed over several weeks is as effective as psychotropic medication for treating mild depression. In addition, the effects of exercise are positive, compared with some of the potential side effects of certain medications. Increasing PA can give a person a boost of enjoyable feelings (Johnson et al., 2012).

Stress

Stress leading to anxiety and depression among college students is quite well studied, including in nursing students (Senturk et al., 2018; Rafati et al., 2017; Sodeify et al., 2019). The effects of physical activity on depression and anxiety have been studied as well (Cummings et al., 2014, Rhodes et al., 2017). Stress in nursing students is higher compared to the general

population and to students in other health care-related fields (Senturk et al., 2018). Three areas of stress are identified for nursing students: academic stressors, clinical stressors, and personal/social stressors. These stressors combine to negatively affect the nursing student's mental and physical health. Students who experience high levels of stress also are more likely to experience anxiety, depression, and suicide (Senturk et al., 2018). Nursing students were found to experience a little more than moderate stress, and Senturk and colleagues (2018) determined that nursing students need to have coping skills taught to them throughout their education and have counseling, orientation programs, and instructors who are aware of coping strategies, available to the students. Of course, it is not possible to avoid stress, but helping nursing students cope with stress is an important aspect of education.

Nearly 50% of nurses experience burnout and stress in acute care settings and leave the field for less stressful jobs (Fitzgerald et al., 2018). Because of this, it is important to teach nursing students strategies for managing stress to help prevent this burnout once they begin their career. PA intervention studies have been shown to improve general health and quality of life, coupled with a decrease in irritability, depression, and anxiety (Stonerock et al., 2017, Ickes et al., 2015, Rhodes et al., 2017).

There are stressful events that nursing students experience including examinations, clinical rotations, potential for harming a patient, personal and societal stressors, caring for patients who are suffering or in pain, caring for those at the end of life, and caring for family members (Senturk et al., 2018, de Souza et al., 2016). A study by de Souza et al. (2016) found the main stressors for nursing students were related to lack of time for leisure activities, spending time with loved ones, and completing extracurricular activities. The highest levels of stress

"were found in the domains of professional training (52.2%), professional communication (33.3%), and time management (32.4%)" (de Souza et al., 2016, p. 518).

Undermanaged stress leads to unhealthy behaviors and can lead to suicidal thoughts and behaviors. Leal et al. (2015) found 5.22% of nursing students exhibited suicidal behaviors, with a higher incidence in female nursing students than in male nursing students. Nursing students have a higher risk of suicidal ideation than the general student population, possibly because of the rigors of nursing school and the exposure to experiences which may cause "psychological pain and mental illness" (Leal et al., 2015). Rathnayake et al. (2016) suggest adding stress management education to nursing curricula in an effort to lessen the "psychiatric morbidity" in nursing students and prioritizing interventions to improve student mental health.

Augner (2015) states that while burnout and stress-related health problems in nurses receive much attention and research, fewer studies examined health and stress-related issues in nursing students Overall academic performance is affected by stress. Augner used several assessment tools to determine stress, pathologic eating, and coping strategies; the WHO-5 well-being questionnaire to assess depression; the Sick, Control, One Stone, Fat, Food (SCOFF) to assess eating behaviors; and the Coping Strategies Inventory Short Form (CSI-SF) to determine coping strategies. In addition, he used the Ten-Item Personality Inventory (TIPI) to assess personality differences, as well as data from the standardized PAF Test Anxiety Questionnaire and the WHO-5 well-being questionnaire, to determine test anxiety or depression and stress. He found a high prevalence of chronic stress and test anxiety in nursing students and recommended that more studies be conducted to evaluate effective coping skills for decreasing test anxiety in nursing students.

COVID-19 has placed additional stress on UC nursing students since there was uncertainty on how their educational experience would be provided during the Spring 2021 semester. These students had to rapidly switch from an in-person experience to an online learning platform in Spring 2020. Some of UC students chose to return home to families that were not welcoming, where there was a poor internet connection, or where their parents were experiencing additional stress because of job loss. Some students experienced financial concerns from losing their campus employment or employment in Lincoln. And students were required to return home and removed from the supportive environment of the school. Dr. Robert Wicks, an expert on resiliency, discussed the increased stress experienced during a pandemic. In an interview, he described resilience not only as the ability to bounce back, but to become a deeper and more mature person and professional (Laskowkski-Jones, 2020). He also addressed secondary stressors common in the nursing field. According to Dr. Wick, secondary stressors are pressures people experience by reaching out to others. These secondary stressors included health care in general, administrative expectations, bullying, understaffing, lack of time for positive feedback from nurse leaders, challenging coworkers and burnt-out colleagues, lack of experience or poor decision-making by colleagues, dealing with families of patients, poor communication between physicians and nurses, and personal family and financial concerns (Laskowkski-Jones, 2020). One of the recommendations for taking care of oneself made by Dr. Wicks was engaging in exercise (Laskowkski-Jones, 2020).

Depression

Students in the health sciences are at increased risk for physical and mental health problems; PA can help relieve symptoms of depression, stress, and anxiety while improving cognition, mood, and quality of life (Fitzgerald et al., 2018). Peireira and colleagues (2019)

report that between 18–55% of nursing students show symptoms of at least moderate depression, with female nursing students experiencing symptoms at twice the amount of male nursing students. The depression experienced during nursing school did not necessarily improve upon graduation, and since nursing still is composed of mostly females, these results should be taken seriously. Another study by Diaz-Godino and colleagues (2019) found 24% of nursing students had mild depression and 19.7% had moderate depression.

A study of nursing students in the African nation of Cameroon found the prevalence of depression was 69.57%, with 26.40% having a major depressive disorder (Njim et al., 2020). This rate is higher than for many other countries, and the medical schools in Cameroon also have reported similar findings. Mental health care is not prioritized in Cameroon, and many schools do not have a dedicated mental health counselor to assist those students who do recognize their need for mental health care. To cope with their depression, many students have adopted poor health habits such as smoking and drinking alcohol (Njim et al., 2020).

Pulido-Criollo and colleagues (2018) report that the demands of health care careers, such as medicine, dentistry, and nursing, predispose students to mental illnesses such as anxiety and depression. Their report estimated 55% of young adults had depression-related symptoms, burnout, and increased alcohol intake while they were students. In the nursing student population, 44.4% feel emotionally taxed and go on to develop a mental disorder (Pulido-Criollo, et al., 2018).

A study by Rathnayake and colleagues (2016) found 51.1% of nursing students reported mild to extremely severe depressive symptoms. Depression was positively associated with stress and anxiety. The factors cited as causes for depression were age, academic year, satisfaction with

the nursing program, and self-rated physical and mental health. More than 50% of participants

reported their physical health as good. Then 18.5% reported neither poor or good, and 16.3%

reported poor physical health. From the same participant sample, 44.6% reported good mental

health, 20.7% reported neither poor or good, and 19.6% reported poor mental health (Rathnayake

et al., 2016)

In a meta-analysis, Li et al. (2018) found less information regarding mental health in

nursing students than for employed nurses. It is important to address mental health and burnout

and to equip nursing students with strategies to cope with stressors in an effort to create a stable

workforce. Depression leads to poorer academic performance, which leads to an increase in

stress; coupled with rigorous coursework and the fear of failing, it becomes cyclical in nature

(Peireira et al., 2019, Abu Ruz et al., 2018).

Anxiety

Anxiety is a natural reaction needed for survival; it is a response by an organism to a

perceived danger that activates the sympathetic nervous system. Anxiety produces psychological

and somatic symptoms such as tachycardia, hyperventilation, heart palpitations, and tremors

(Pereira et al., 2019). When these symptoms become chronic, they can lead to phobias,

conversive disorders, dissociative states, obsessions, or compulsions (Pereira et al., 2019).

Anxiety can be beneficial, since it can motivate people to act or respond to a situation. It

provides motivation and encouragement for preparing for examinations and presentations.

Pereira et al. (2019) conducted a descriptive, qualitative study that examined feelings students

had about situations that could potentially cause anxiety. Four themes emerged from this study:

feelings of anxiety during the university adaptation period, tests, facing reprobation, and towards

the professor/student relationship in the teaching/learning process. Anxiety may disrupt academic life, influence how the student nurse acts professionally, and may carry over into their professional life and how they care for patients (Diaz-Godino et al., 2019). Nursing students were found to have moderate to severe levels of anxiety, but normal, nondepressed mind state, although some were found to have low to moderate levels of depression. This was coupled with the presence of self-reported unhealthy lifestyles in the following categories of the Health Promoting Life Profile-II instrument (HPLP-II); nutrition, physical activity, responsibility in health, spiritual growth, interpersonal relationships, and stress management (Diaz-Godino et al., 2019).

Abu Ruz et al. (2018) found that identifying anxiety and depression in nursing students and the effect these have on a student can help institutions and nursing programs devise methods to help students cope, maintain a satisfactory grade point average, and have less absenteeism. This can lead to a "higher commitment to nursing, lower withdrawal from the profession, and better patients' care" (Abu Ruz et al., 2018). Anxiety negatively affects academic performance and could impair overall cognitive function and performance (Abu Ruz et al., 2018).

According to Pulido-Criollo et al. (2018) the most common mental disorder in students is anxiety, with a higher prevalence found in women than men; women also report higher stress levels. In addition, 75–90% of medical and nursing students reported an increase during their last year of training, in alcohol and tobacco use, despite knowing its effects. In the general student population, 44% reported feeling emotionally stressed and developed a mental disorder (Pulido-Criollo et al., 2018).

Rathnayake and colleagues (2016) reported 59.8% of nursing students reported having anxiety. Anxiety was positively related to depression and anxiety. The factors contributing to anxiety were age, self-rated physical health, and self-rated mental health.

Physical Activity

Rathnayake and colleagues (2016) found a significant association between depression symptoms and physical health. Poor physical health affects students' education as well as their professional lives. Engaging in regular physical activity can improve physical health. However, physical activity has been found to decrease as one gets older, with the most rapid decline seen in the adolescent years (Dalton et al., 2018). High levels of depressive symptoms cause an increase in poor health habits such as binge eating and decreased physical activity (Dalton et al., 2018).

Nursing students are some of the busiest students on college campuses. Chan (2014) found that of all of the lifestyle behaviors, exercise or PA was one of the behaviors least engaged in by nursing students. Although their study also indicated that as a whole, students' engagement with PA dropped significantly when they entered college, despite their major (Yan et al., 2015). Preto and colleagues (2018, p. 713) found that nursing students who participated in weekly leisure activities, including sports and lifestyle changes, had a decrease in stress levels and better academic performance and quality of life.

Health care providers who engaged in regular PA also are more likely to promote PA with their clients. Fitzgerald et al. (2018) conducted a study with 202 medical and graduate nursing students. The study asked questions from the Behavioral Risk Factor Surveillance System (BRFSS) about their exercise capacity and physical state, obtained anthropometric measures of height and weight, and assessed self-efficacy for engaging in PA using the Exercise

Self-Efficacy Scale. Statistically significant findings were found between BMI and BRFSS ratings of low physical and low emotional health, physical or emotional health impact on activity, and poor sleep in the low cardiovascular fitness group. PA was associated with positive health outcomes. These researchers concluded that further research should be done examining how medical and nursing school curricula could include content on how PA can lead to improved mental, emotional, and cognitive well-being.

Establishing healthy lifestyle habits, such as regular physical activity in combination with other good habits such as maintaining an ideal body weight and abstaining from smoking, and drinking less alochol, is associated with a 66% reduction in mortality (Chow et al., 2018). However, many people do not meet the ACSM's minimum recommended levels of PA. More interventions are needed that increase individual motivation to get the recommended amounts of PA. Miragall et al. (2018) devised a study using pedometers (PED) with a group of low-PA students, along with internet-based motivational interventions (IMI), to test whether these interventions increased PA. Of the three study groups, two groups used the IMI + PED, with the first group receiving specific information about pedometers, while the second group's pedometers were blinded so they could not personally track their daily steps. The control group received the pedometer, which was also blinded, and they did not receive the IMI. The participants wore the pedometers for three weeks, with the blinded pedometers brought in weekly for downloading. The study found that the IMI + PED group increased their daily steps by an average of 2,069 per day. The IMI group (with blinded pedometers) increased their steps by 1,050 per day. The study determined that multicomponent interventions delivered greater results. The researchers suggest focusing on self-efficacy and personalized goals as well as exercise enjoyment.

Rhodes et al. (2017) discussed the method in which PA is characterized using the acronym FITT for F = Frequency, I = intensity, T time, and T = type. Frequency is how often a person is active. Intensity is how vigorous the PA is. Time is how many minutes a day or week a person is active or the length of a single episode of PA. For adults ages 18–64 years the recommended amount of PA per week is 150 minutes of moderate intensity aerobic PA or 75 minutes of vigorous intensity aerobic PA. Routine PA is associated with a decreased risk for all-cause mortality. Regular PA also is associated with the primary prevention of more than 25 chronic medical conditions, including cardiovascular disease, cancer, and type 2 diabetes.

In addition, Rebar and colleagues (2015) found that PA caused a significant, moderate decrease in depression They found a few studies that also indicated improved cognitive function in young to middle-aged adults. In their evaluation of the effectiveness of interventions for increasing PA, they found only a few that showed a positive correlation—effective strategies were supervision, frequency of contact, and behavioral interventions.

Chan (2014) found exercise was one of the least common lifestyle behaviors engaged in by undergraduate nursing students. She defined exercise self-efficacy as "an individual's perceived capability to engage in physical activity regularly in the face of perceived barriers." In a study with 195 undergraduate nursing students, Chan's study examined the perceived self-efficacy, barriers to exercise, the benefits of exercise, and how nursing faculty could assist undergraduate students to engage in exercise The participants answered two questions regarding frequency and time of PA and completed a self-efficacy scale regarding physical exercise and a barrier/benefit scale on exercise. Male nursing students in this study doubled the time they spent in PA over female nursing students. The main barriers found to students engaging in PA were fatigue and lack of time. This study suggests that nursing faculty can recommend other ways for

students to engage in PA that may be less tiring, and help students learn time management skills to maintain a balance between work and leisure activities.

A large prospective study of 33,908 adults over 11 years conducted by Harvey and colleagues (2018) examined whether exercise provided protection against new-onset depression and anxiety, and if so, how much exercise and what intensity is required, as well as factors that underlie an association. These researchers reported evidence indicating exercise as an effective treatment for depression. According to Harvey et al (2018) some of the reasons exercise is thought to be effective in treating depression and anxiety are related to the autonomic nervous system (ANS). Exercise increases parasympathetic vagal tone resulting in a lower resting heart rate and vagal nerve stimulation has been used to treat depression. Other ways exercise is effective is through the physical, social, and self-esteem benefits. The results found a statistically significant negative relationship between total amount of PA and risk for future depression. However, there was no difference between level of exercise and risk for anxiety. Presuming causality, they predicted that "12% of new case depression could be prevented if all adults participated in at least one hour of exercise each week.". They also found that most of the protective effects of exercise were realized with small amounts of exercise, and no additional benefit was found with exercise totals greater than one hour per week (Harvey et al., 2018).

Gaps in Literature

The benefits of PA on anxiety, depression, and mental health in college students have been widely studied (Stonerock et al., 2017; Ickes et al., 2015; Rhodes et al., 2017). Anxiety, depression, and stress in nurses and undergraduate nursing students also have been widely studied (Leal et al., 2015; Rafati et al, 2017; Senturk et al., 2018). However, only a few studies were found that explored the effects of PA on anxiety and depression in undergraduate pre-

nursing and nursing students using intervention-based research (Alsaraireh et al., 2017; Miragall et al., 2018; Mohebbi et al., 2019). This study could provide a catalyst for deeper exploration of this topic.

Chapter 3

Methodology

The research method utilized for this study was a quasi-experimental mixed methods intervention-based research design examining the effects of PA on anxiety and depression in pre-nursing and undergraduate nursing students. This design was chosen to allow any pre-nursing or nursing student at UC to participate in the study. The mixed methods research design allowed the investigator to obtain both quantitative and qualitative data in order to evaluate the research problem (Hafsa, 2019). The study used the Patient Health Questionnaire 9 (PHQ-9) and the Generalized Anxiety Disorder- 7 (GAD-7) instruments as well as two qualitative questions asked at the conclusion of the study. The intervention was a regimen of physical activity that follows the FITT principle (F=frequency, I=intensity, T=type, and T=time) (Jonas et al., 2009).

Setting

The setting was Union College (UC), a small Seventh-day Adventist, liberal arts college located in Lincoln, Nebraska. Total enrollment for the 2020–2021 academic year was 677 undergraduate students and 87 graduate students. There were 111 nursing students enrolled for Spring 2021, and 39 students had declared a pre-nursing major. The required G* power was determined to be 35-40 using G*Power software. This software program is widely used in social, behavioral, and biomedical sciences (Faul et al., 2007).

Recruitment of Participants

Selection criteria of the participants was:

Enrolled as pre-nursing majors or nursing majors at UC for the Fall 2020 semester.

Exclusion criteria were:

1. Pre-nursing or nursing students who were not able to perform moderate physical activity.

2. Pre-nursing or nursing students who routinely performed more than 90 minutes a week of moderate physical activity.

3. Pre-nursing or nursing students under the age of 19 (the age of maturity in Nebraska).

Students were informed about this research project during the semi-annual Back-to-School Fair held in the Nursing Division at UC. Following the announcement at the fair, an invitation to participate was sent to every pre-nursing and nursing student. The invitation was sent via email with a link to a google survey that included the informed consent form (Appendix E), a pre-enrollment questionnaire that included a demographic information form and the excluding question about the ability to perform moderate PA, and the PHQ-9 and GAD-7 instruments. Once the student gave their informed consent to participate in the survey, they assigned themselves a code name, which served to identify them throughout the study. The results of the survey and the exercise log were linked via the codename. Following enrollment, participants completed the pre-test measures (PHQ-9 and GAD-7 Scale).

Participants were asked to provide an email address. Only the researcher had knowledge of the participants' names so she could send the participants informational emails (Appendix F) after they were included in the. This semi-anonymity was made clear to all participants during the survey; they also were informed that they could voluntarily opt out at that point. Also, at any point a participant could drop out of the study without experiencing any repercussions.

Intervention: FITT

The intervention began the first week of school (January 11) during the Spring 2021 semester. The intervention was provided in the form of FITT as follows:

1. Frequency of exercise: 3 days a week for 6 weeks.

2. Intensity: Moderate aerobic activity, such as brisk walking (as evidenced by the ability to talk but not sing).

3. Time: 30 minutes a day or 90 minutes a week.

4. Type: Brisk walking, jogging, swimming, bicycling or some other enjoyable aerobic activity.

The intervention lasted six weeks. There were four different intervention groups based on the time the participant completed the pre-intervention survey. The last participant completed the intervention on April 9, 2021.

Each week, the participants were asked to complete a survey question about their minutes of intentional PA for the week. A link to an exercise log was sent to all participants every Friday, asking participants to record their total number of minutes exercised. This information was put onto a spreadsheet with the codename. In addition to the exercise log, they also received two informational emails each week related to health and primarily about physical activity (e.g., the importance of PA in cardiovascular health). Some of the additional emails discussed appropriate clothing for inclement weather, stress management, sleep, proper nutrition for depression and anxiety, and well-being. An example of these informational emails is included in the Appendix.

At the conclusion of the intervention, the participants were again asked to complete the PHQ-9 and the GAD-7 Scale. They also were asked to answer the following two qualitative

questions: 1. How would you describe the effect the physical activity intervention had on you? 2. What has been the biggest influence in your mental health over the last six weeks?

Institutional approval

Approval for the research study was requested through the Institutional Review Board (IRB) for Southern Adventist University. Approval to conduct the survey was received in September 2020; the IRB tracking number is 2020-2021-008 (Appendix C). After receiving the approval, a request for approval to carry out the intervention, describing the study and the implications of the research project, was submitted to the Human Subjects Research Board (HSRB) of Union College. Approval was received from HSRB in October 2020 (Appendix D).

Instruments

Student participants enrolled in the study completed two questionnaires assessing their anxiety and depression. Participants completed these questionnaires at enrollment (pre-test) and again at six weeks (post-test) following completion of the FITT intervention.

The pre and post questionnaires used in this study were the Patient Health Questionnaire 9 (PHQ-9) and the Generalized Anxiety Disorder 7 (GAD-7) screening tool. The PHQ-9 was developed in 1999 by Kurt Kroenke and his colleagues at Columbia University. The PHQ-9 was adapted from the full length PHQ. This module scores each of the DSM-IV depressive criteria on a scale from "0" (not at all) to "3" (nearly every day). The score can range from 0 to 27. The tool has an internal reliability with a Cronbach's α of 0.89 and has excellent test-retest reliability (Kroenke et al., 2001). The ninth question asks "over the last 2 weeks how often have you been bothered by any of the following problems? Thoughts that you would be better off dead or of hurting yourself in some way."

The GAD-7 is a shortened clinical measure for assessing anxiety. This 7-item anxiety scale has good reliability and procedural validity. A cut point of 10 was identified as having optimized sensitivity to .89 and specificity at .82 (Spitzer et al., 2006).

Statistical Analyses

Data analyses were conducted by Vamsi Manthena, a PhD candidate in Statistics at the University of Nebraska-Lincoln. The R-3.6 (R) statistical program was used for the analyses. R is employed for statistical calculations and graphics and uses a computer language that branches and loops using functions. R is useful for a variety of statistical calculations, including parametric and nonparametric tests, which were used to generate some of the statistics in this study (R Core Team, 2013).

The dependent variables were the anxiety and depression scores from the GAD-7 and PHQ-9, and the independent variable was physical activity in minutes performed. The goal was to determine whether there was a statistically significant change in the score of the PHQ-9 and the GAD-7 at the end of the 6-week intervention period. A paired-sample t-test was conducted to compare scores for the pre- and post-intervention PHQ-9 and GAD-7 questionnaires. The researcher then reviewed the completed statistical tests to determine whether any findings were statistically significant.

Qualitative Analysis

At the conclusion of the PA intervention, the participants were sent a post-intervention survey that included the following two open-ended survey questions:

- How would you describe the effect the physical activity intervention had on you?

- What has been the biggest influence in your mental health over the last six weeks?

The two open-ended, qualitative questions on the post-intervention survey were evaluated to determine themes using a six-step method as described by (Caulfield, 2020).

Ethics

The risks of the study included, but were not limited to, fatigue, musculoskeletal injury, and stress. If the PA was performed outdoors there is the possibility of inclement weather which may cause the student to not get their minutes of PA completed. The benefits of participating in the study included, but were not limited to, improved cardio-respiratory fitness, improved outlook, and improved physical and mental health. The study was not 100% confidential since the researcher had access to the participants' emails. To compensate for this, the researcher asked the participants to provide a codename on their survey and their exercise logs. The researcher also did not collect the emails via the survey so the student needed to supply it on the survey itself. Both the Southern Adventist University IRB and the Union College HSRB have full access to all data results, if desired.

Chapter 4

Analysis of Results

Study Sample Description

The population of interest for this quasi-experimental mixed method interventional study is pre-nursing and nursing students enrolled at UC in Lincoln, Nebraska, during the Spring 2021 semester (January 11 to April 30, 2021). Of the 158 students currently enrolled in either the nursing program or as pre-nursing undergraduates, 43 returned the pre-intervention survey. Of these students, there were a greater number of female respondents at 37 or 86%. Males made up the remaining 6 respondents, or 14%. The participants' ages ranged from 19 (n=2) to 42 (n=1), with the majority reporting an age of 21 (n=15). Only one pre-nursing student (2.3%) completed the pre-intervention survey.

The Nursing Program at UC is divided into five levels, which represent the five semesters of the nursing curriculum. Two of the respondents (4.5%) were from Level 1, three (6.8%) students were in Level 2, thirteen (29.5%) students were in Level 3, eight (18.2%) students were in Level 4, and seventeen (38.6%) students were in Level 5. Race and ethnicity were not obtained.

Variables

The independent variable was the recommendation of engaging in PA for 30 minutes a day, three times a week. The participants could choose to do the type of PA that best suits them. This included but was not limited to running, swimming, cycling, weight training, yoga, or walking. The dependent variables were scores on the PHQ-9 and GAD-7 instruments. Covariates included age, gender, and level in nursing school.

Statistical Analysis

In this study, there were 37 female and 6 male participants in the pre-intervention survey. There was a 42% attrition rate, with only 23 female and 2 male participants completing at least 50% of the intervention and the pre and post surveys. First, the covariates of gender, age, and level in the nursing program of the completers were analyzed. One pre-nursing student completed the pre-intervention survey but did not complete the post-intervention survey. There were 26 post-intervention surveys completed, however one survey was not completed and was not included in the data. This left a final sample of 25 completers—23 females and 2 males as shown in Figure 4.1.

2Figure 4.1. Distribution of Participants by Gender
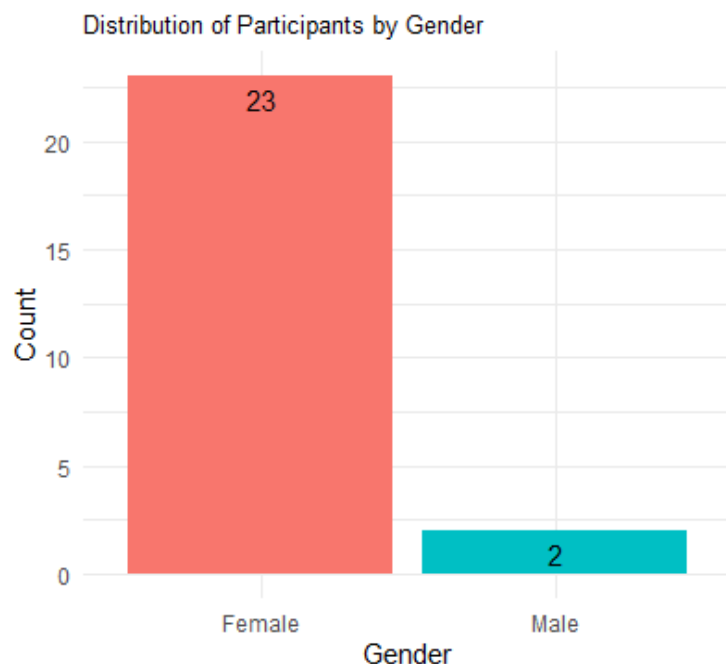
Figure 4.2 shows the distribution of intervention completers by level in the nursing program. This data can help to identify which level may cause the participants the most anxiety or depression.

3Figure 4.2. Distribution of Participants by Level in Nursing Program

Figure 4.3 shows the age of participants. It is important to collect the age because it will show the age frequency distribution of the participants. The mean age of the completers (n=25) was 24.5 years.

4Figure 4.3. Age of Participants

Histogram of Age of Participants

Hypotheses Analysis

Hypothesis one was that the students' PHQ-9 and GAD-7 scores would be lower than their pre-PA intervention score after completing the PA intervention. The first hypothesis looked at the completers of th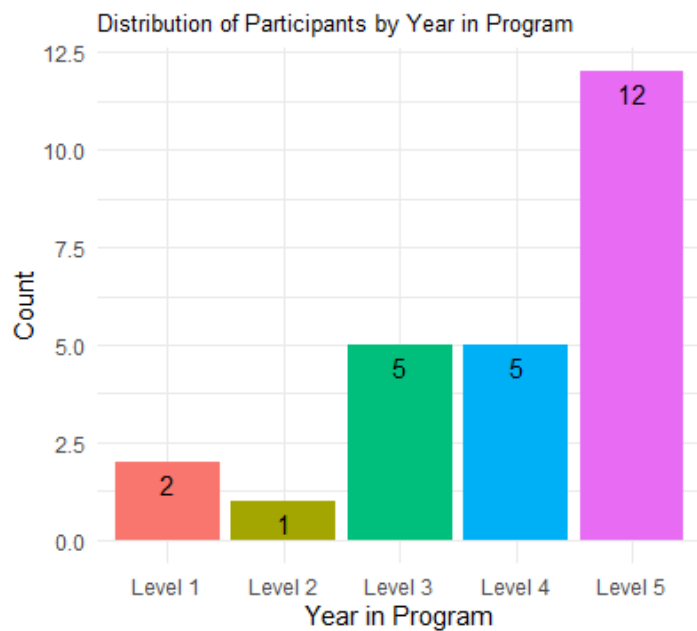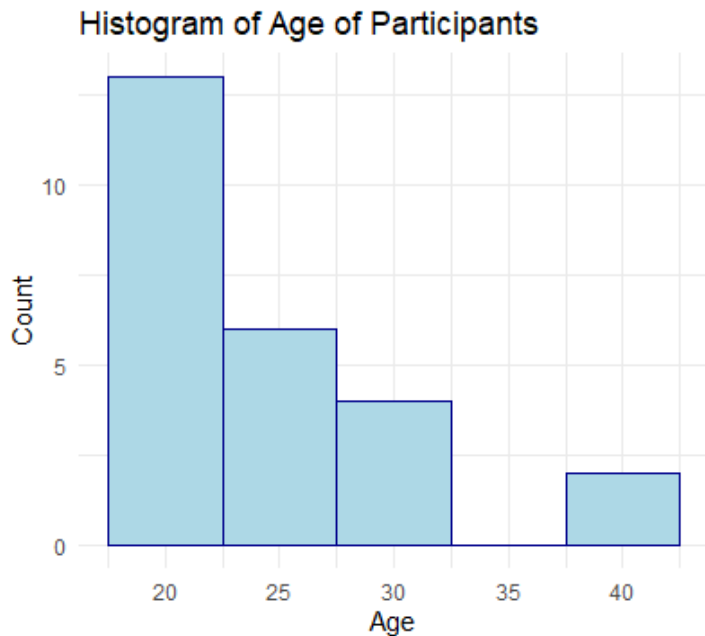e intervention. A total of 25 participants completed the pre- and post-intervention survey. In order to visualize the scores, the researcher categorized the depression (PHQ-9) and anxiety (GAD-7) scores into status.

From the two side-by-side plots (Figures 4.4 and 4.5), it is clear that there was a marked reduction in depression scores between the pre- and post-intervention periods. First, the Shapiro-Wilks test was performed to check for normality of the difference between pre- and post-intervention scores. The p-value from the Shapiro-Wilks test for comparing pre- and post-intervention depression scores was 0.2677. Since this is greater than 0.05, the conclusion that the normality assumption holds were drawn. Thus, a paired t-test was used for the analysis. The results from the paired t-test showed that the average difference in depression scores between the

pre and post intervention was 4.64 units. Further, from the t-test, a p-value of 0.0001984 with

df= 24 and 95% CI was obtained. This showed that there was a significant difference in the

depression scores between the pre-intervention and the post-intervention periods. From this, we

can infer that PA was effective in lowering the depression scores for the completers. The

completers depression status demonstrated improvement with the majority of scores representing

minimal depression, n=21 (84%) and no scores representing either moderate, moderately severe,

or severe depression.

5*Figure 4.4. Distribution of Participants by* Depression Status (Pre-Intervention)
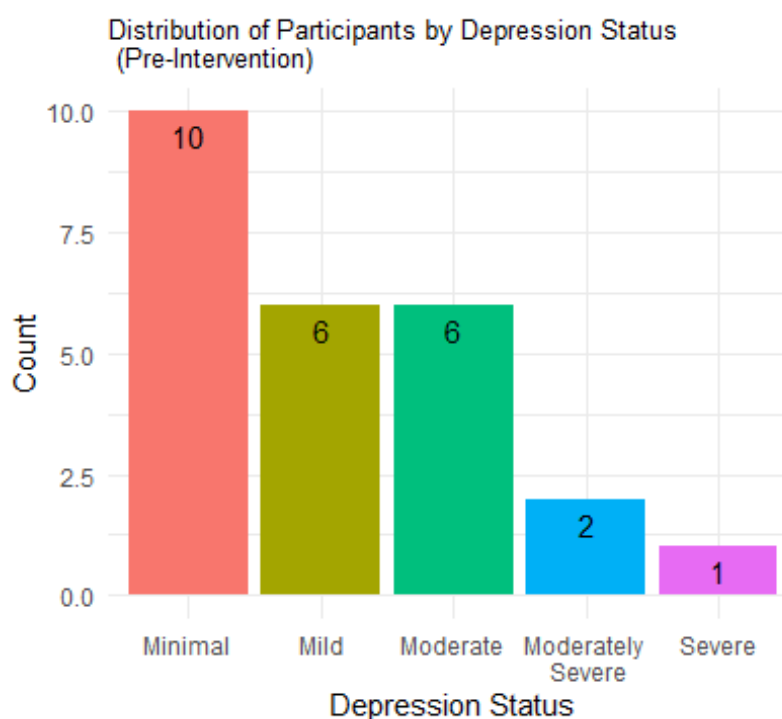
6*Figure 4.5. Distribution of Participants by Depression Status (Post-Intervention)*
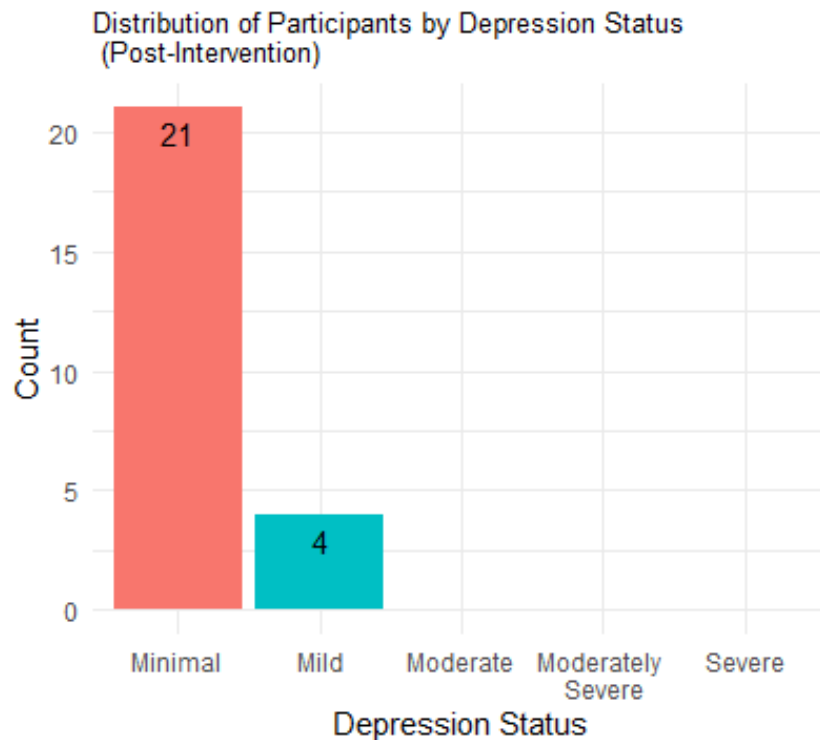
Distribution of Participants by Depression Status (Post-Intervention)

A visualization of these results using a boxplot is shown in Figure 4.6.

7Figure 4.6. Boxplot of Depression Scores for Pre- and Post-Intervention

Boxplot of Depression Scores for Pre- and Post Intervention
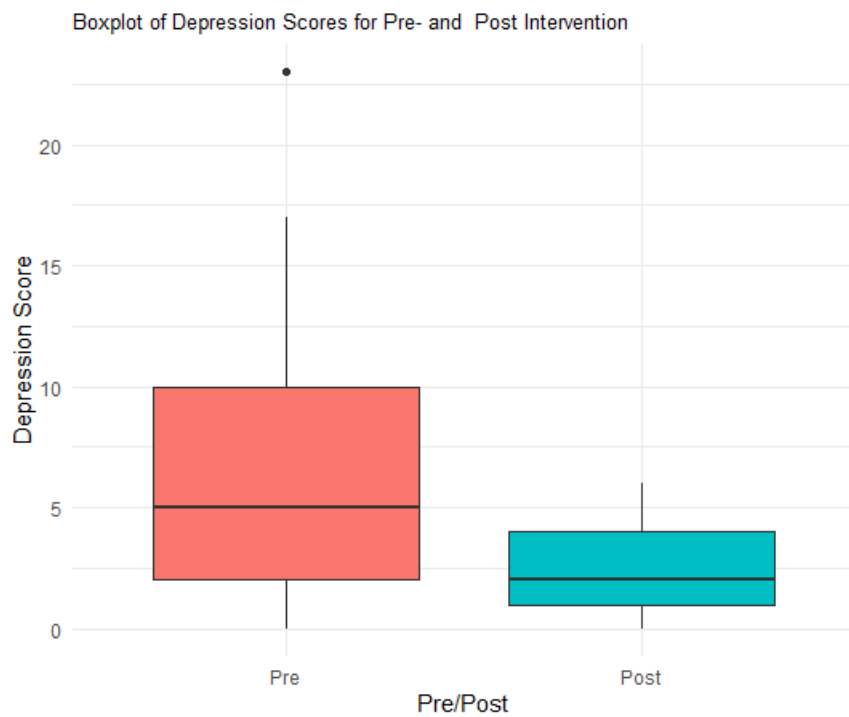
From the two side-by-side plots shown in Figures 4.7 and 4.8, it is clear that the there is a marked reduction in anxiety scores from the pre- to post-intervention period. First, the Shapiro-Wilks test was run to check for normality of the difference between pre- and post-intervention anxiety scores. The p-value from the Shapiro test for comparing pre- and post-intervention anxiety scores was 0.0353. Since this is smaller than 0.05, the conclusion that the normality assumption does not hold was drawn. Thus, a non-parametric test, the Wilcoxon Signed Rank test, was used for the analysis of the paired data. The results of the Wilcoxon test give a p-value of 0.0013, which indicated that there is a significant difference between the pre- and post-intervention anxiety scores. This implies that PA was effective in decreasing the anxiety status of the participants. The 12 completers who reported moderate to severe anxiety on the pre-test reduced their anxiety status to mild anxiety post-intervention.

8Figure 4.7. Distribution of Participants by Anxiety Status (Pre-Intervention)

*9Figure 4.8. Distribution of Participants by Anxiety Status (Post-Intervention)*

Distribution of Participants by Anxiety Status (Post-Intervention)
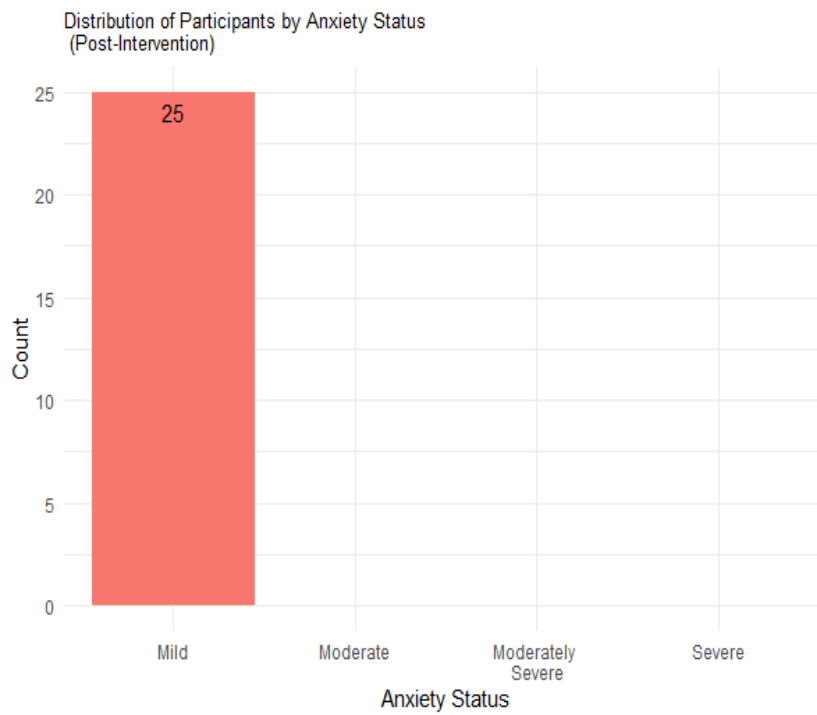
A visualization of these results using a boxplot is shown in Figure 4.9.

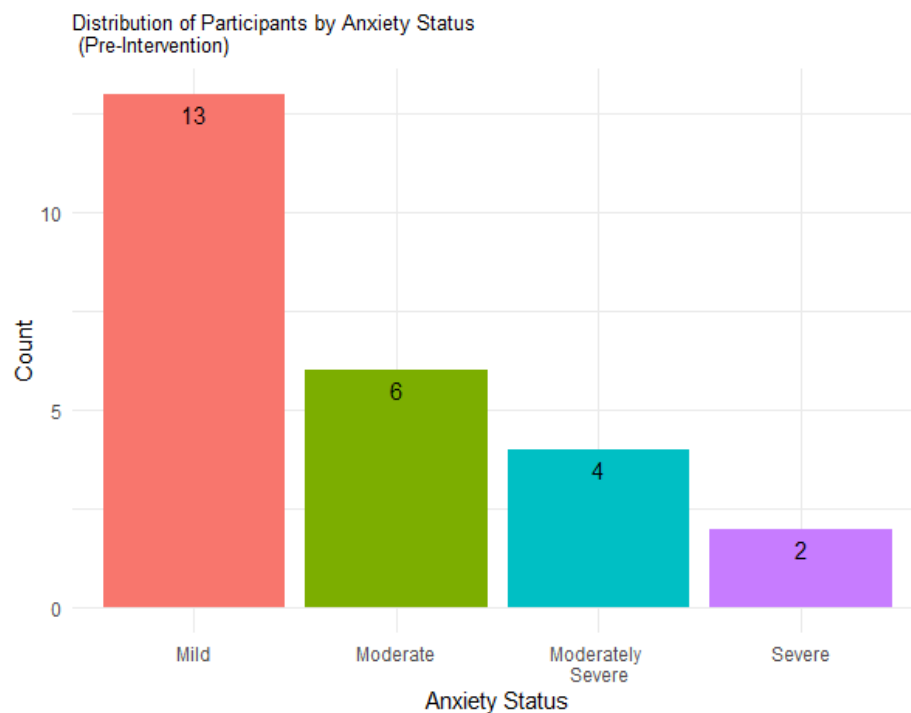*10Figure 4.9. Boxplot of Anxiety Scores for Pre- and Post-Intervention*

Boxplot of Anxiety Scores for Pre- and Post Intervention
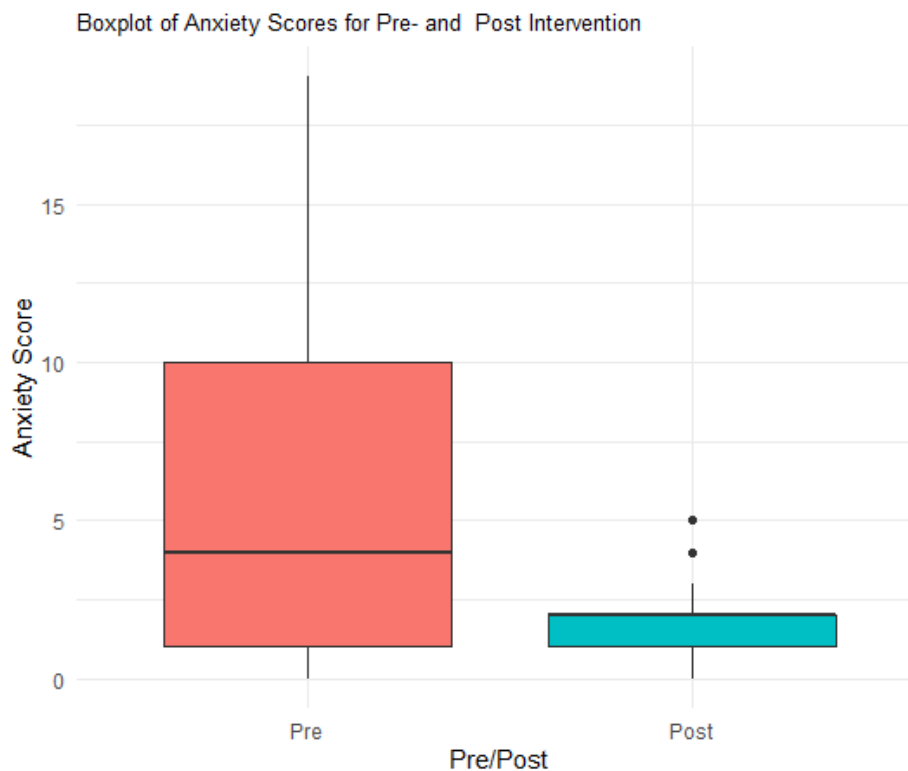
Next, the level of the nursing program of participants was analyzed and compared with depression status. It is evident from the graphs that all of the participants with severe depression at the pre-intervention assessment were in Level 5 as shown in Figure 4.10. Figure 4.11 shows the post-intervention results and the decrease of all completers to minimal to mild depression.

11Figure 4.10. Distribution of Participants by Depression Status and Level in the Nursing Program (Pre-Intervention)
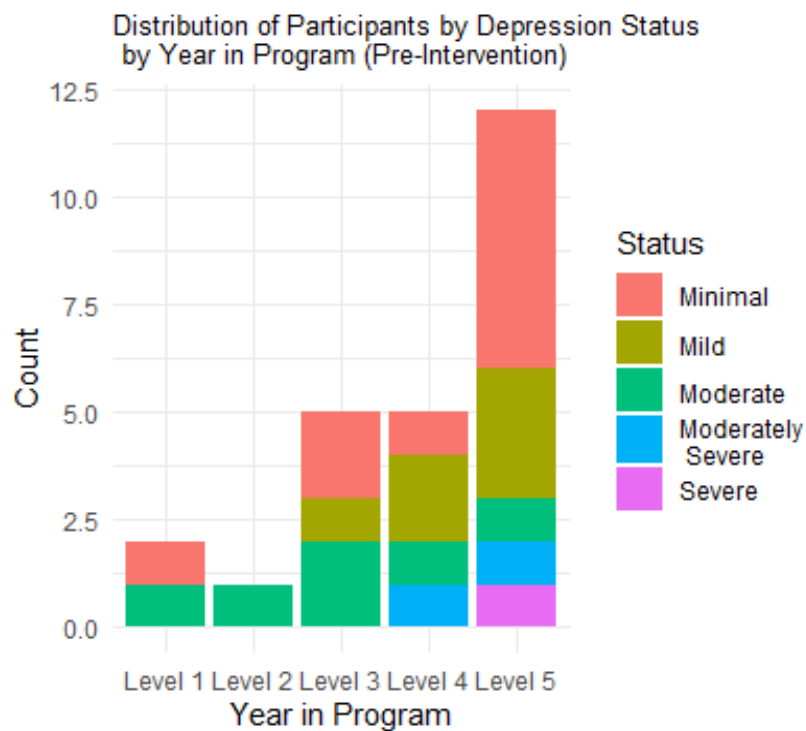
Distribution of Participants by Depression Status by Year in Program (Pre-Intervention)

12Figure 4.10. Distribution of Participants by Depression Status by year in Program (Post-Intervention)

Distribution of Participants by Depression Status by Year in Program (Post-Intervention)
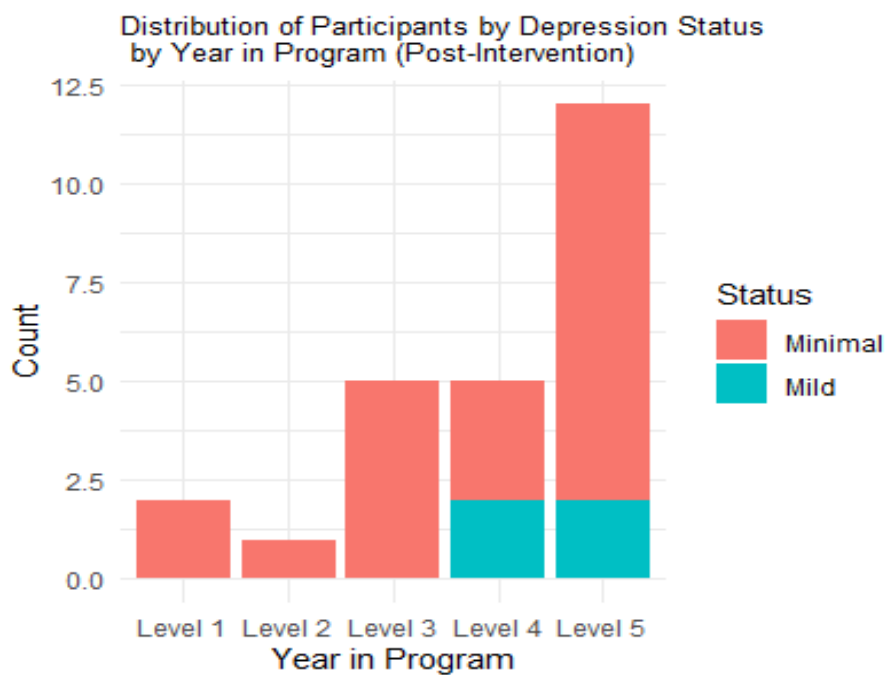
Next, the level in the nursing program was analyzed and compared to participants'
anxiety status. It is evident that all of the participants with severe anxiety status at the pre-
intervention assessment were in Level 5 as shown in Figure 4.12. Figure 4.13 shows the post-
intervention results and the decrease of all completers to mild anxiety.

*13Figure 4.12. Distribution of Participants by Anxiety Status by Level in the Nursing Program
(Pre-Intervention)*
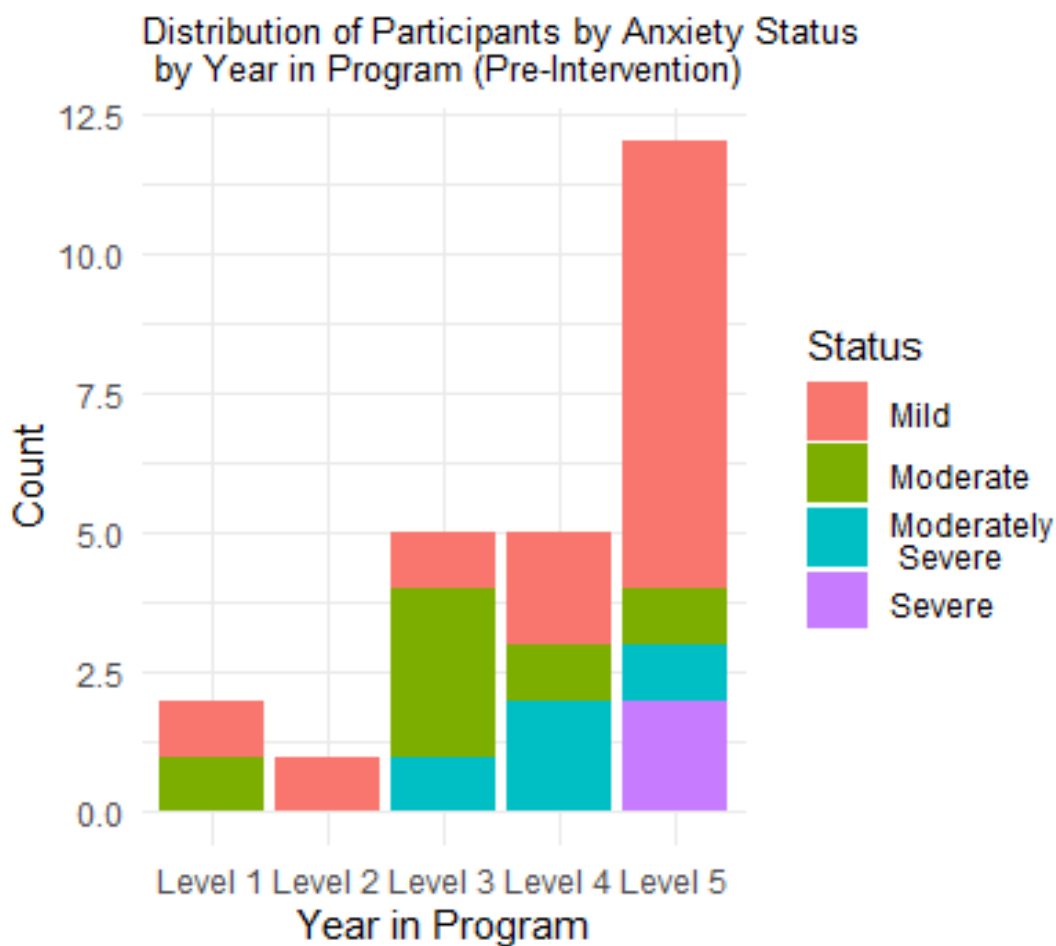
14Figure 4.13. Distribution of Participants by Anxiety Status by Level in the Nursing Program (Post-Intervention)
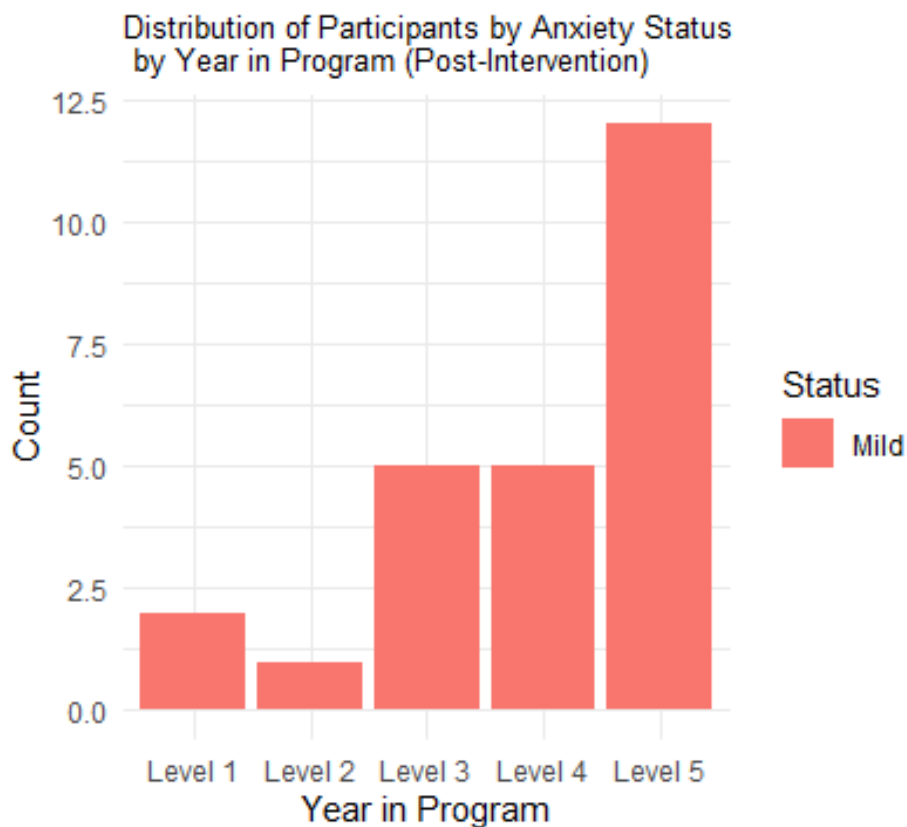
The second hypothesis, that students who did not participate in the PA intervention fully would not demonstrate a decrease in the scores for the PHQ-9 and GAD-7, was not possible to analyze because no data were obtained for the non-completers. If the student completed the pre- and post-intervention survey and provided the weekly PA exercise log, it was considered that they had completed the intervention. This was corroborated by the statistical analyses.

The third hypothesis, that pre- and post-intervention scores would not be statistically significantly different in students who did not complete the PA intervention was analyzed by testing the pre-intervention scores between the non-completers and the completers to see whether there was a statistically significant difference in their depression and anxiety scores. The results

of this analysis show that all of the participants started the intervention with similar scores. The completers did not begin the intervention more or less depressed or anxious than the non-completers.

Figures 4.14 and 4.15 provide a visualization of the differences between these two groups of participants. The distribution of participants by depression status are grouped by completion status. Y/N indicate "yes, completed the study" and "no, did not complete the study," respectively. These two bar plots indicate that there is not much difference in the initial depression status between those who completed the study and those who did not. This shows that the completers had similar scores as the non-completers and were not more or less depressed.

The Shapiro-Wilks test was used to analyze the difference in depression scores between completers and non-completers. The Shapiro-Wilks test for depression score differences had a p-value greater than 0.05, indicating that normality assumption was violated. Since this was not a paired data set, a Mann-Whitney U test was performed. The results of the Mann-Whitney U test found no significant differences in the results between the pre-intervention depression scores between completers and non-completers (p = 0.6125).

15Figure 4.14. *Distribution of Participants by Depression Status: Participants Who Completed the Intervention vs. Non-Completers*

Distribution of Participants by Depression Status (Pre-Intervention)
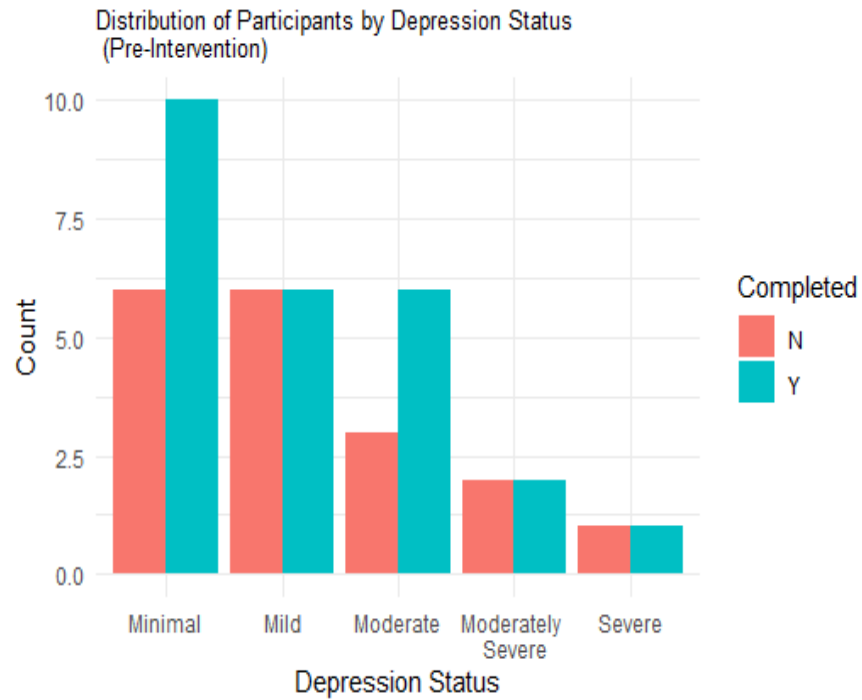
A visualization of these results using a boxplot is shown in Figure 4.15.

16Figure 4.15. Boxplot of Depression Scores by Completion Status

Boxplot of Depression Scores by Completion Status (Pre-Intervention)
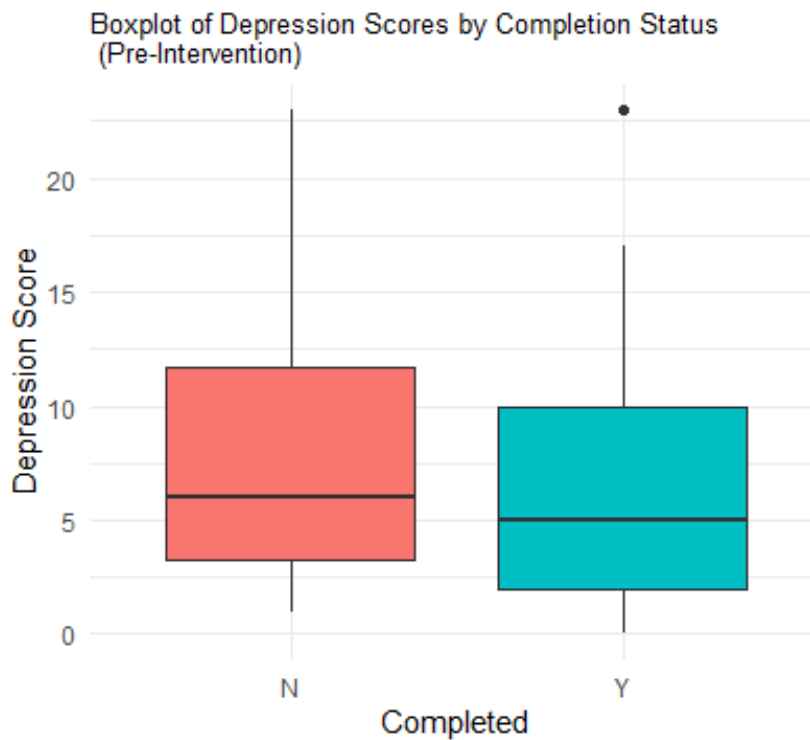
Figure 4.16 provides a visualization of the differences between these two groups of participants by anxiety status. The distribution of participants by anxiety status are grouped by completion status. Y/N indicate "yes, completed the study" and "no, did not complete the study," respectively. This bar plot indicates that there is not much difference in the initial anxiety status between those who completed the study and those who did not. This shows that the completers had similar scores as the non-completers and were not more or less anxious.

The Shapiro-Wilks test was used to analyze the difference in anxiety scores between completers and non-completers. The Shapiro-Wilks test for anxiety score differences has a p-value greater than 0.05, indicating that the normality assumption was violated. Since, this is not a paired data set, a Mann-Whitney U test was performed. The results of the Mann-Whitney U test found no significant differences in the results between the pre-intervention anxiety scores between completers and non-completers ($p = 0.9014$).

17Figure 4.16. Distribution of Participants by Anxiety Status: Participants Who Completed the Intervention vs. Non-Completers
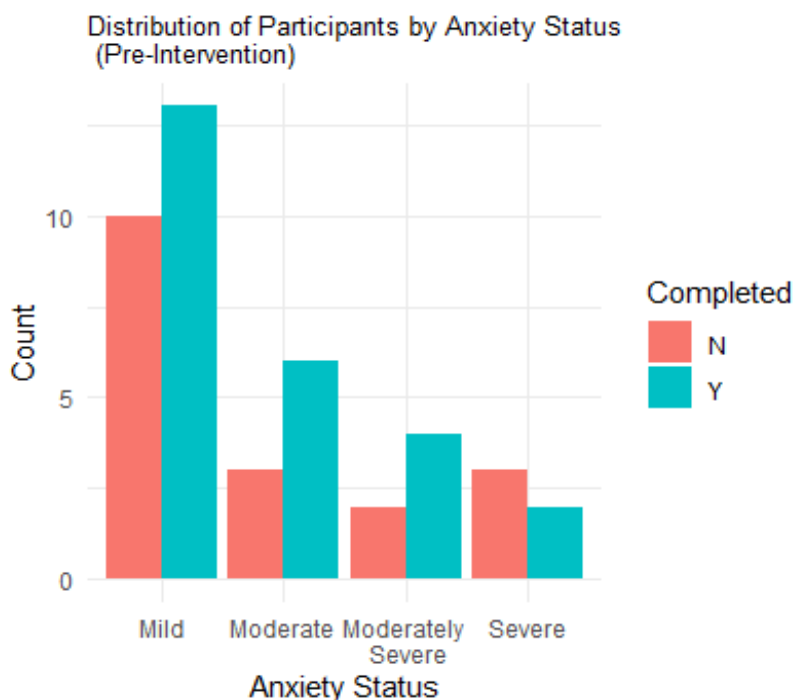
A visualization of these results using a boxplot is shown in Figure 4.17.

18Figure 4.17. Boxplot of Anxiety Scores by Completion Status

Boxplot of Anxiety Scores by Completion Status (Pre-Intervention)
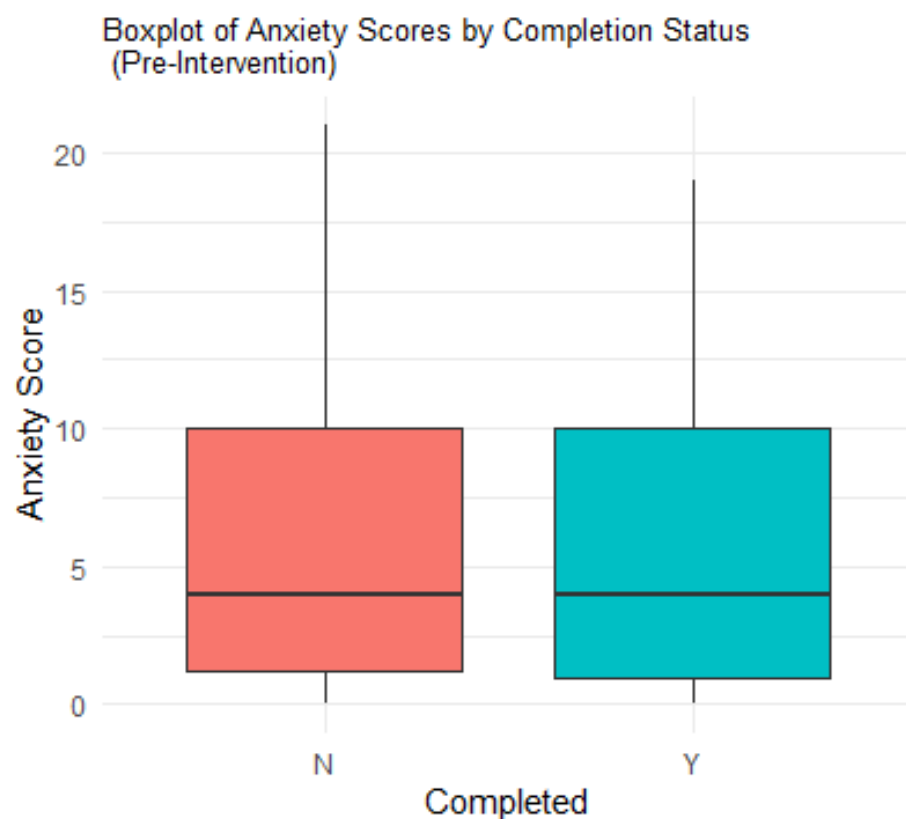
Qualitative Questions

At the conclusion of the PA intervention, the participants were sent a post-intervention survey that included the following two open-ended survey questions:

- How would you describe the effect the physical activity intervention had on you?

- What has been the biggest influence in your mental health over the last six weeks?

The 25 completed surveys were analyzed for themes revealed from the two qualitative questions. Key words and phrases were highlighted and assigned a label. After reviewing the labels, themes began to emerge. The themes were reviewed and compared to the data to ensure accuracy. The researcher used a six-step approach, as defined by Caulfield, to performing the

qualitative analysis. The data first was reviewed to gain familiarity and then codes were generated; in this case, the codes were descriptive labels that summarized the content. These words then were evaluated for themes across the answers and themes were defined from the descriptive codes. The themes were as follows.

For the first question, **"**How would you describe the effect the physical activity intervention had on you?" four themes emerged:

- ▪ Improved self-confidence and self-esteem

- ▪ Improved ability to sleep

- ▪ Increase in physical health

- ▪ Improved mental health

For improved self-confidence and self-esteem, students made comments such as, "I feel a lot better about myself, and for the first time in a LONG time, I actually feel pretty and confident," and "It helped me feel a sense of accomplishment."

For improved ability to sleep, students made comments such as, "I slept a little better," and "I was better able to sleep."

For improved physical health, students made comments such as, "I felt more energy," and "I'm not out of breath after climbing up the stairs to my apartment anymore."

For improved mental health, students made comments such as, "I felt that it was an awesome stress reliever; I saw a decrease in stress levels," "It uplifted my spirits and mental energy. I am in a more positive space," and "I felt happier and better about myself for trying to care for my body."

For the 25 students who answered this question, it is evident that the physical activity had a positive effect on their mental health, with a side benefit of improving other areas of their lives

such as physical health and sleep.

For the second question, "What has been the biggest influence in your mental health over the last six weeks?" the following five themes emerged:

- Self-confidence

- Exercise

- Support

- Sleep

- Stress

For self-confidence as an influence on their mental health, one participant reported "feeling good about myself and accomplished." Other participants wrote: "I have been strength training, and even looking in the mirror while I work out at the gym has made me realize that what I used to think about myself was not true at all," and, "I look healthy and feel healthy and being active in the gym and working out has had a huge influence on what I eat. I feel like since I started doing this project for Larinda, I have made healthier choices in what I eat."

For exercise as an influence on their mental health, participants reported "being active has helped improve my mental health," "exercising with friends," and "I would say that [*sic*] biggest influence on my mental health would've [*sic*] be getting to go and actually workout outside. The weather has been really nice lately and it's motivated me to want to work out more."

For support as an influence on their mental health, some participants reported, "devotional as always and family and friends," and "my strong support system."

For sleep as an influence on their mental health, two participants reported "getting enough sleep," and "trying to get extra sleep when I could."

For stress as an influence on their mental health, two participants reported "the worry about big papers and presentations weighs on my mind and negatively impacts my mental health. The fear of failure and fear of the consequences [sic] procrastination are often in the back of my mind and cause me stress. My coping mechanisms are sleeping and putting things off even more. So, I am trying to change things and get stuff done so I will be more mentally well." and "Nursing is incredibly stressful and the stress to do well and pass because I have been in college longer than I would have liked to have been. And also, the stress to make my father proud really make [*sic*] me anxious sometimes."

One of the items on the PHQ-9 participants were asked to rate read, "Thoughts that you would be better off dead or of hurting yourself in some way." If a participant answered anything other than "not at all," the survey took them to a separate page with this message from the principal investigator:

> "Because of your answer to this question, I encourage you to seek out professional help. The school counselor is Lorie Escobar and she can be reached at 402-540-2354 or 402-486-2800. Her email is lorie.escobar@ucollege.edu. Please reach out to me, your advisor, Pastor Rich, or another trusted person to help you navigate this time. You are valued and loved. I will be contacting you via email or in person within 24 hours."

In the pre-intervention survey, two participants answered this question as having had these thoughts for "several days." These participants were sent them an email encouraging them to contact the P.I. or to reach out to one of the people listed above. These participants did not contact the researcher and did not complete the post intervention survey, but did continue in the nursing program. One participant completed only two weeks of PA and the other participant did not record any minutes of PA. In retrospect, more emphasis should have been placed on reaching

out to them since they did not respond to my email.

    In the post-intervention survey, one participant answered this question as having had these thoughts for "several days." However, this participant did not provide an email address or a code name that was correlated with the one in the pre-intervention survey; as a result, the researcher was not able to contact this participant. In hindsight, the email address should have been a required field, which would have allowed the researcher the option to contact the participant if needed.

Chapter 5

Discussion of Findings

The purpose of this quasi-experimental mixed method study was to determine whether engaging in 30 minutes of physical activity three days a week had any effect on the anxiety and depression scores of pre-nursing and nursing students.

Hypothesis 1. After completing the intervention, the students' post-intervention PHQ-9 and GAD-7 scores would be lower than their pre-PA intervention scores. This hypothesis was supported, since the results of the statistical analyses showed that PA had a significant effect on the students' depression and anxiety scores.

Hypothesis 2. The students who did not fully participate in the PA intervention fully would not demonstrate a decrease in the scores for the PHQ-9 and GAD-7. This question could not be answered because there was not a control group and therefore there was no data for the non-completers other than the pre-intervention survey.

Hypothesis 3. The scores would not be statistically significantly different in students who did not complete the PA intervention as prescribed. There was not a statistically significant difference between the pre-intervention scores of the completers compared with the non-completers. This is important to note because it shows that all of the participants demonstrated similar levels of depression and anxiety and those that completed the intervention were no more or less depressed or anxious than those that did not complete the intervention. However, the completers showed statistically significant decreases in their depression and anxiety scores following the 6-week intervention.

The statistical results of this study show that even minimal PA can be effective in decreasing depression and anxiety. Pre-nursing and nursing students have rigorous academic schedules and experience depression and anxiety related to their personal expectations and the responsibility that comes with nursing school. The students are looking for ways to help manage depression and anxiety; PA can be free and as simple as walking. The results show what is known in research: PA is effective in managing symptoms and decreasing depression and anxiety. Chan (2014) found three benefits of PA defined by nursing students: increased level of fitness, improved mental health, and exercise enjoyment. The results of this study support the improved mental health benefit. For the 25 participants who completed this study, there was a statistically significant decrease in their depression scores (p = 0.0001984) and a statistically significant decrease in their anxiety scores (p = 0.001352).

No unusual or unexpected outcomes were identified in this study. However, the researcher did not expect there would be as many non-completers. PA promotes health and relieves stress. It was thought that the participants would want to continue to engage in PA because it is "good" for them. However, as with other potential motivators, knowledge along is not sufficient to make someone do something that is good for them. Many times, people are not ready to change their behavior(s). Many participants may be in the precontemplation or contemplation stage of change and not ready to prepare or act to carry out a particular new health habit. In addition, while some participants may have been excited about the intervention at the beginning of the semester, as the semester wore on, the PA became one more thing to do and may have created more anxiety or stress for some students.

The study's findings support the research found in the literature review—PA on average, decreased the depression and anxiety scores. When the pre-intervention surveys were analyzed

with the Mann-Whitney U test between the completers (n=25) and non-completers (n=18), there was not a statistically significant difference in their PHQ-9 (p = 0.6125) and GAD-7 (p = 0.9014) scores. However, a statistically significant decrease was found between the pre- and post-intervention scores of the completers, p = < 0.05.

Although nursing is a health profession, much of formal nursing education is focused on treatment of disease processes and medications, and very little is taught about lifestyle habits in the context of their own lives. Personal lifestyle habits are discussed briefly as they related to various disease processes, but they are not the focus of nursing education. Traditional college students are at a time in their lives where it is easier to correct lifestyle choices and new lifestyle habits may be formed, yet, during this time, PA greatly drops off unless the student has a sports-related scholarship (Lee et al., 2018). In addition, with the increase in gaming, television viewing, and smartphones, has contributed to an increase in the amount of time a student sits, even during leisure time (Lee et al., 2018). Lifestyle medicine is focused on the prevention of chronic diseases such as cardiovascular disease, type 2 diabetes, and obesity caused by poor lifestyle choices. Although these chronic diseases may not be evident during the college years, the groundwork is laid for these diseases to manifest themselves in the future. PA is shown to reduce the incidence of these chronic diseases (Stonerock et al. (2017)

Observations

It was interesting that not many nursing students signed up to participate in this intervention. Since the students recruited into the study were in nursing or pre-nursing programs, it was thought that they would want to improve their own mental health, and, as a side benefit, their physical health. The high attrition rate also was interesting. Although four reminder emails were sent during the Spring semester asking students to complete the survey and specifically

encouraging them to complete these measures even if they did not do all of the recommended minutes of PA, only9 additional responses were received.

The highest level of depression and anxiety was found in Level 5 students. This level is the last semester of nursing school at Union College, and is perceived by the students to be the easiest semester. So, it was unexpected when the Level 5 students displayed high levels of severe depression and severe anxiety. Several issues may contribute to this. During their final semester, students are focused on job searches and interviews; they take a comprehensive examination that predicts their probability of passing the National Council Licensure Examination (NCLEX-RN®); they are preparing for their preceptorship, a time when they work side by side with a registered nurse in a chosen area of nursing for several weeks; and they are preparing to take the NCLEX-RN® after graduation. Also, during the Spring 2021 semester, COVID-19 may have contributed to their high levels of depression and anxiety. There always was the fear that the college would close for in-person learning and students would have to again transition to online school as they did in the Spring 2020. The Level 5 students were enrolled in Medical-Surgical II nursing when the pandemic began. In this level, they care for patients in a progressive care unit. Normally, the students currently in Level **5** would have had nine clinicals rotations in the spring of 2020 during Level 3, but the Spring 2020 semester was cut short by COVID-19, they did not get to go into the clinical hospital setting following spring break. In fact, some students were only able to complete two clinical rotations prior to switching to online classes and doing virtual, simulated clinical training. This lack of experience may have contributed to their depression and anxiety as well. Also, because the senior students did not know whether they would be able to have an in-person pinning ceremony or graduation until the

middle of April 2021, it was difficult for them to make plans for their graduation, which may have contributed as well to their higher anxiety and depression.

I learned much more about PA and the importance of PA in managing or treating depression and anxiety and the importance of moving one's body, even if just walking. PA allows one to focus on something other than stress, and I learned more about human behavior than expected. For example, that while some may people have good intentions, they may not follow through and complete a study, especially when the study is lengthy and requires participation. I also learned that it is not just about the benefits of PA but the consequences of a sedentary or inactive life (Egger, et al., 2017).

The PHQ-9 and the GAD-7 are excellent instruments and performed as expected. The survey was easy to distribute and easy for the students to complete if they chose to. However, the physical activity log form did not perform as expected. The answers on the form were not limited by week; it was an open form that allowed students to insert their time of PA for any week. In reviewing the data, some students would fill in several weeks at a time. Although it was thought that the form should be structured this way to allow them to be able to do this in the event they forgot to enter their PA time in the log during particular week, it may have weakened the validity of the data by allowing the students to enter their times whenever they wanted.

It is interesting to see how the results bore out the hypothesis and observe the positive effects the PA had on the students' PHQ-9 and GAD-7 scores. The comments to the qualitative questions also supported the hypothesis. Those participants who recognized the benefits of PA hopefully will continue to incorporate it into their lives.

Limitations

There were several limitations of this research study. The study was limited to pre-nursing and nursing students at UC. This could be considered convenience sampling bias since it only was open to pre-nursing and nursing students who were readily accessible to the nursing professor researcher.

The demographic variable of race or ethnicity was not collected in the survey, which is a limitation. Knowledge of race and ethnicity can help guide future research and highlight disparities for these population groups within the current research project. Harris et al. (2018) found minority women to have a greater burden of "health disparities associated with lower physical activity." Women, in general, are less active than men, and minority women have even less PA, which leads to them being more at risk for chronic diseases such as cancer, type 2 diabetes, and cardiovascular disease (Harris et al., 2018). Heller and colleagues (2016) studied students at an ethnically diverse community college and found 39.7% of students met the recommended guidelines for PA as compared to the 50.6% national sample that met the recommended PA guidelines.

I was not able to effectively answer one of the hypotheses: That the students who did not participate in the PA intervention fully would not demonstrate a decrease in the post-intervention scores for the PHQ-9 and GAD-7. This hypothesis would have been better answered with a control group to compare the pre and post scores on the PHQ-9 and GAD-7. I could only compare the pre-intervention scores between the completers and the non-completers.

The applied intervention of 30 minutes of PA three times a week was adapted from the ACSM recommendation of 30 minutes of PA five times a week (ACSM 2018). This change was

made to increase the likelihood of students completing the intervention. As it was, the exercise log participation dramatically dropped in responses at the midpoint of the intervention or at week 3. Although any increase in PA is beneficial, if the intervention was shorter in duration of minutes or times a week, it may not have shown statistically significant results. It is possible that the length of the intervention (6 weeks) was a contributing factor to the attrition rate of 46%.

Another limitation was the time of year when the intervention occurred. Although the intervention was originally planned for the Fall 2020 semester, it was pushed back to the Spring 2021 semester. In Nebraska, January and February are cold winter months. This year was no exception; there were extreme temperatures during February 14–16 (-16°F with wind chills making it even colder). Even when the temperatures began rising, the temperature was still below freezing. This made it hazardous to go outside, potentially negatively impacting the participants willingness or ability to engage in some forms of PA, particularly those that involved being outdoors.

In addition, COVID-19 eliminated most indoor opportunities for PA. There were exceptions made for varsity sports, but nursing students typically do not participate in varsity sports because of nursing clinical responsibilities. Students needed to find ways to complete this intervention in the face of extreme weather and a pandemic. Some students may have found that too challenging to do.

There were no offers of any monetary or academic incentives to complete the intervention. Perhaps a gift card could have been given to those who completed the pre- and post-intervention survey. This may have improved the final participation numbers.

Implications for future projects/research

More intervention-type studies should be done with PA and college students, in general, and not only nursing students. It would be interesting to incorporate other lifestyle habits in the study as well, such as a plant-strong diet, sleep, stress management, positive relationships, and substance avoidance. These habits could be part of a questionnaire inquiring about these aspects in a student's life. This study could also be done with the employees (staff and faculty) at colleges and universities. This would provide an interesting comparison between the two groups of people found on campuses. It would be beneficial to add race and ethnicity to the demographic questionnaire since research shows that minority students engage in less PA and have an increased risk for chronic diseases (Harris et al., 2018; Heller et al., 2016).

If this research study was to be conducted again, the study should be presented differently during the recruitment phase at the beginning. It may be beneficial to do a short presentation in one of the nursing courses to inform them of the project before they receive the invitation email. The email approach may have hindered pre-nursing students from participating since they do not attend classes within the nursing building and are unfamiliar with the professors, including this study's researcher.

The invitation email was sent four separate times to recruit pre-nursing students. Despite these attempts, only one pre-nursing student participated in the pre-intervention survey and did not complete the intervention or the post intervention survey. When the project was presented to the nursing students, it was during the semiannual town hall meeting on the first day of school for the semester. There is a lot of information given to the students during this meeting and numerous activities they are required to do as well during the back to school fair also held that day. There may have been too much information for them to process, so that adding a voluntary

PA activity may not have been of interest to them. A presentation held on another day that highlights the benefits of PA and opportunities to acquire minutes of PA may be beneficial.

The research design using the PHQ-9 and GAD-7 tools were sufficient. However, the reporting of the PA minutes was not efficient and the data was difficult to extract from the exercise log filled out by participants. In the future, only the days when the PA occurred would be reported, rather than the actual minutes of PA. This would be a simpler way to collect and report the data. In addition, a weekly walk with the study participants may have been helpful. This would be an optional activity offered on a Saturday or Sunday and would be at a local lake, which is two miles from campus. This would need to be addressed in the IRB as this would violate participant anonymity.

The topic of PA needs to become a focus of colleges and universities. Some students are arriving at college and exhibiting depression and anxiety. Although institutions of higher education offer mental health services to students, some students may not seek these out. By having ample opportunities for students to participate in PA throughout their college experience, we hope that this will carry on into adulthood and be a positive influence on their future health. It also serves as a trickle-down effect to future generations, because if they remain active their family also most likely will be active. This will promote good health for succeeding generations and can affect health care globally.

Implications for practice/health policy/education

Depression and anxiety are prevalent among college students, and in nursing students in particular (Tung et al., 2017, Pereira et al., 2019). Chronic diseases, such as cardiovascular disease, obesity, and type 2 diabetes are related to lifestyle choices (Egger at al.,2017, p. 7).

Physical activity is one component of lifestyle medicine that is shown to reduce risk for chronic diseases as well as for managing symptoms of depression and anxiety (Egger et al., 2017). This study showed that just 30 minutes of PA performed three times a week can lessen depression and anxiety in nursing students.

The next steps are to improve the PA participation of not only the pre-nursing and nursing majors, but of all of UC students. The college is in the process of fund-raising for a new health and wellness center. The completion of this project is still five or more years in the future. However, the researcher could work with the athletic director and the director of health and human performance in developing the program, Exercise is Medicine®-On Campus (EIM-OC), through the American College of Sports Medicine (ACSM). This program began in 2009 to provide resources to colleges and universities about EIM and EIM PA programming. The vision of EIM-OC is to reduce the burden of chronic disease and promote prevention of chronic diseases. They recognize the importance of students developing healthy habits while in school (Winters et al., 2015). Winters and colleagues noted that, "EIM-OC is rooted in the belief that no student should graduate from a college or university without a lifetime plan for fitness and that students, faculty, staff, and administrators engage in movement as a daily aspect of campus life." It would be advantageous to conduct a campus wide survey to learn about the PA habits of all of the students as well as those of the college employees. This would work well with the current health insurance carrier that requires participation in healthy lifestyle habits to reach a higher tier of coverage.

Education about the importance of PA as a lifetime health habit is important. Currently, UC requires the class, "Concepts of Wellness," for all students with the exception of nursing students. Concepts of Wellness teaches practical theory of general and cardiovascular fitness and

the principles of health as supported by the Seventh-day Adventist denomination. It is expected that the nursing curriculum will cover these topics. However, the nursing curriculum focuses primarily on disease management and treatment. Although content on prevention and lifestyle habits are becoming more widespread in nursing textbooks, nursing students need opportunities to put this information to use and develop these as personal health habits they will carry with them when they go into practice.

It is difficult to create policies regulating or requiring PA. However, insurance companies are offering incentives for their subscribers to live a healthy lifestyle. Some of these are better coverage or decreased premiums. The insurance company provided to college staff through the Adventist educational system requires active participation in healthy lifestyle habits in the current year to qualify for the highest insurance tier the following year. Some of these factors may facilitate an increased interest and participation in PA for some people.

Conclusion

It is important for pre-nursing and nursing students to cope with stress effectively in order to manage depression and anxiety. PA was shown to decrease depression and anxiety scores in this small quasi-experimental study of undergraduate nursing students. PA is an important component of a healthy lifestyle; the healthy lifestyle habits formed in college may positively affect the students the remainder of their lives. As students incorporate daily PA into their lives, they may benefit in the short-term regarding stress management, and management of potential depression and anxiety, as well as in the long-term for preventing chronic diseases such as obesity, diabetes, and cardiovascular disease.

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Appendix A

Instruments

Generalized Anxiety Disorder 7-item (GAD-7) scale

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all sure	Several days	Over half the days	Nearly every day
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it's hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3
Add the score for each column		+	+	+
Total Score *(add your column scores)* =				

If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all _____
Somewhat difficult _____
Very difficult _____
Extremely difficult _____

Source: Spitzer RL, Kroenke K, Williams JBW, Lowe B. A brief measure for assessing generalized anxiety disorder. *Arch Inern Med.* 2006;166:1092-1097.

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? (Use "✔" to indicate your answer)	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

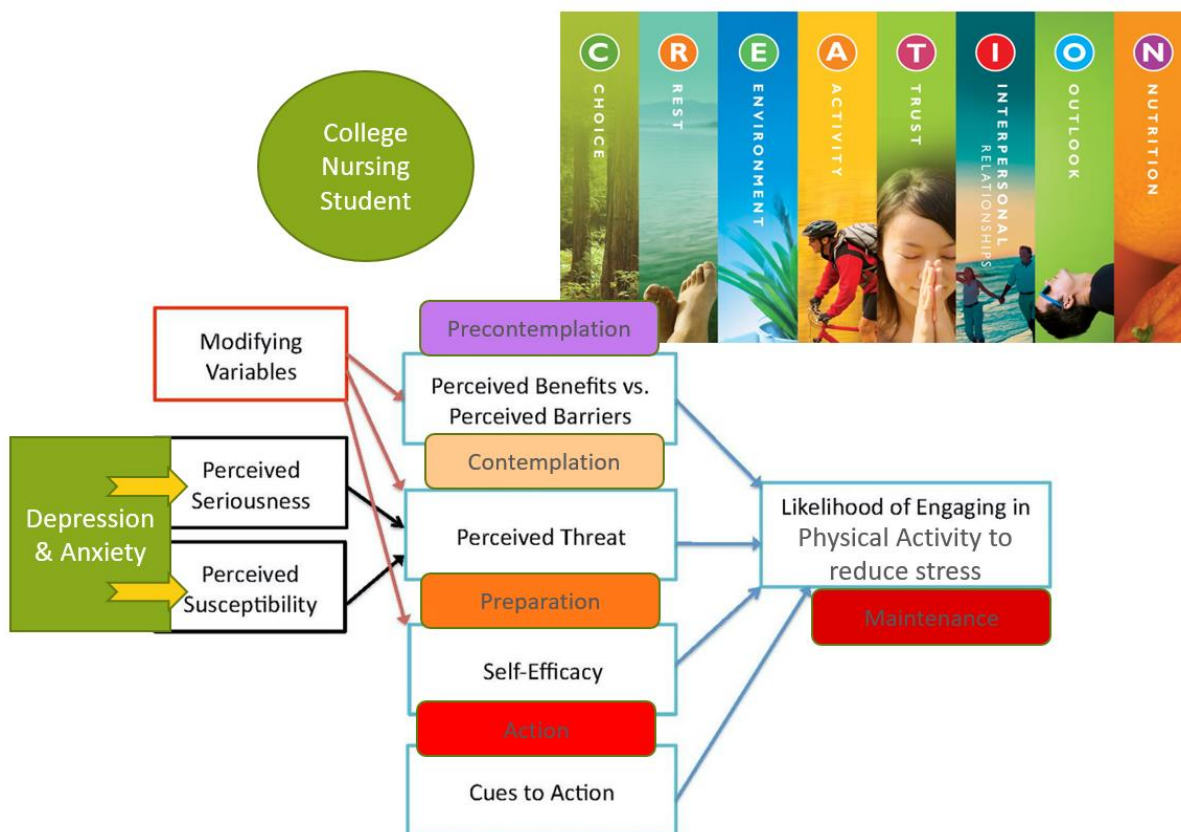FOR OFFICE CODING ___0___ + _____ + _____ + _____

=Total Score: _____

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult
☐	☐	☐	☐

Appendix B

Theoretical Framework

Figure 1.1

Appendix C

IRB Approval from Southern Adventist University

September 30, 2020

Principal Investigator: Larinda Fandrich
Research Project: The Effect of Physical Activity on the Mental Health of Pre-Nursing and Undergraduate Nursing Students
IRB Tracking Number: 2020-2021-008

Dear Larinda,

It is a delight to inform you that your research protocol titled "The Effect of Physical Activity on the Mental Health of Pre-Nursing and Undergraduate Nursing Students" has been approved by the Southern Adventist University Institutional Research Board according to the proposal. You are now authorized to proceed with the project as outlined. This approval expires May 31, 2021.

As a principal researcher, you have the ultimate responsibility for the conduct of the study, adherence to ethical standards, and protection of the rights and welfare of human participants. As you proceed with your research, you are expected to:

1) Conduct the study according to the approved protocol.
2) Make no changes to the approved study. If changes are necessary, proceed with one of the following:
   a) For minor changes to this protocol, please notify IRB by submitting an IRB Form B and proceed after its approval.
   b) For substantial changes, submit a new IRB Form A and proceed after its approval.
3) Use the approved procedure and forms for obtaining informed consent and data.
4) Promptly report any significant adverse events to the IRB within five working days of occurrence using an Adverse Report Form.

All forms must be submitted to irb@southern.edu.

We wish you many blessings as you move forward with this study and look forward to reading your findings when they are ready. If there is anything else we can do to assist you with this research study, please contact us.

Always in His service,

Cynthia M. Gettys, PhD

Director, Center for Teaching Excellence   office. 423.236.2285
and Biblical Foundations of Faith and Learning   cell. 423.227.2352
Chair, Institutional Review Board   address. PO Box 370. Collegedale, TN 37315
Southern Adventist University   "I will instruct you and teach you in the way you should go. I will counsel and watch over you." Psalm 32:8
Responsibility – Input – Strategic – Learner – Achiever

"I applied my mind to **study** and to explore by wisdom all that is done under the heavens..." - Ecclesiastes 2:13
"Research is to see what everyone else has seen and to think what nobody else has thought." - Albert Szent-Gyorgyi

Appendix D

HSRB Approval from Union College

UNION
C O L L E G E

Experience the Spirit

30 October 2020

Dear Larinda Fandrich:

It is my pleasure to inform you that your proposed research:

> **Title:** The Effect of Physical Activity on the Mental Health of Pre-Nursing and Undergraduate Nursing Students
>
> **Principle Investigator:** Larinda Fandrich
>
> **Co-Investigators & Consultants:** Dr. LaShawn Horton

is granted approval by the Union College Union College Human Subjects Research Board (HSRB) Committee. This approval is granted for one calendar year from this letter's date of issue. If any aspect of this project changes, this HSRB approval is void. In such a case, please notify the HSRB committee chair of the changes and apply for HSRB re-approval.

Best wishes on your research project.

Sincerely,

Christina Burden-Page, M.S., Ph.D.
Associate Professor
Human Subjects Research Board, Chair
christina.burden@ucollege.edu

UNION COLLEGE

A Seventh-day Adventist
Liberal Arts College

5800 South 48th Street
Lincoln, NE 68506-4385

402.486.2600 *phone*
402.486.2895 *fax*

www.ucollege.edu

Appendix E

Informed Consent

The Effects of Physical Activity on the Mental Health of Pre-Nursing and Undergraduate Nursing Students: Pre-Intervention Survey

Informed Consent

You are being invited to participate in this research study to learn more about the effects of physical activity on depression and anxiety scores in pre-nursing and undergraduate nursing students.

If you agree to participate, you will complete this pre-intervention survey and agree to perform 30 minutes of moderate physical activity (brisk walking, jogging/running, swimming, or some other aerobic activity) three days a week for six weeks. At the end of the six weeks, you will complete the a post-intervention survey with an additonal two questions asking about your experience, and complete an online exercise log (the link will be provided). You agree to receive up to two emails a week with helpful information regarding physical activity and/or depression and anxiety. Your email information will not be shared with any other parties and will be collected from the survey. Your name or any identifying information will not be shared outside of the research study. You will assign yourself a code name on the survey and exercise log.

The pre and post-intervention surveys will take about 5-10 minutes of your time. The physical activity intervention occurs three times a week for 30 minutes each time for six weeks and is on your own time. You will assign yourself a code name on the survey that you will remember and use for the followup survey.

Exclusions from this project include being under the age of 19 which is the age of maturity for Nebraska, you currently perform moderate aerobic physical activity 90 minutes or more a week, you are physically unable to perform 90 minutes of moderate aerobic physical activity a week, or you do not wish to participate in this project.

We will take steps to keep your personal information confidential, but we cannot guarantee total privacy. All collected data will be stored on a password protected computer. Only myself as the principal investigator, Dr. LaShawn Horton, as the project advisor, and the qualitative software manager will have access to the data. The data will be presented in aggregate form and themes and all personal identifiers will be removed.

You will not incur any costs as a result of your participation in this study. If you agree to participate, you will receive the experience of participating in a research study and contributing to the empirical body of knowledge, as well as basic knowledge of the effects of physical activity on depression and anxiety.

The collected data may be used in future studies to expand on the need for physical activity opportunities for pre-nursing and nursing students and enhanced mental health services. It may be used to incorporate physical activity into the nursing curriculum.

All studies have some degree of risk and the potential risks in this investigation include but are not limited to worsening depression or anxiety, muscle soreness or strain, sprained joints, and fatigue. By clicking "Yes" to the question below, you are giving permission to participate in the study.

If you do join, and later change your mind, you may quit at any time. If you withdraw early from the project, there will be no penalty to you.

AUTHORIZATION: I have read the above and understand the nature of this study. I understand that by agreeing to participate in this study I have not waived any legal or human rights and that I may contact the researcher at Southern Adventist University, Larinda Fandrich, 402-525-4904 at any time. I agree to participate in this study. I understand that I may refuse to participate, or I may withdraw from the study at any time. In addition, I understand that if I have any concerns about my treatment during this study, I can contact Dr. Cynthia Gettys at Southern Adventist University Institutional Review Board at 423-236-2285.

* Required

1. I agree to particpate in this survey *

   Mark only one oval.

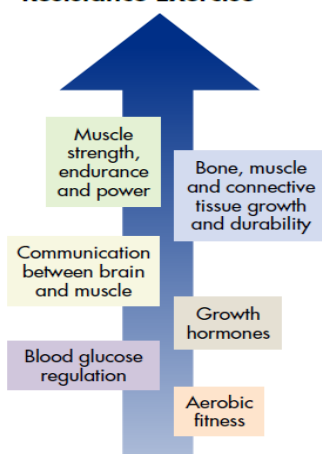   ◯ Yes

   ◯ No

Appendix F

Informational Email Content Example

Resistance Training for Health

People of all ages and abilities who regularly participate in resistance exercise reduce risk of numerous diseases, improve quality of life and reduce mortality.

Key Physiological Benefits of Resistance Exercise

Muscle strength, endurance and power

Bone, muscle and connective tissue growth and durability

Communication between brain and muscle

Growth hormones

Blood glucose regulation

Aerobic fitness

Resistance Exercise Can Help Manage and Treat Many Conditions

Including:
- Arthritis
- Cancers
- Cardiovascular disease
- Dementia
- Depression
- Diabetes
- Fall risk
- Frailty
- Hypertension
- Insomnia
- Low back pain
- Mental health
- Movement disorders
- Obesity
- Osteoarthritis
- Osteoporosis
- Pulmonary disorders
- Peripheral vascular disease
- Stroke

Training can be time efficient and effective for health benefits:

For health benefits, muscles need to be challenged with a combination of weight lifted, repetitions and speed of lifting. The addition of resistance training to aerobic programs can also enhance other health gains throughout the life span from childhood to old age.

Exercise Plan:

- Free weights, machines and/or bands can be used
- Perform 8-10 multi-joint exercises that stress the major muscle groups
- Perform 2-3 sets of 8-12 repetitions with good form
- Lift and lower the weight in a controlled manner (2 seconds each up and down)
- The last repetition should be difficult to complete
- Perform exercise 2-3 times per week
- Progress weight lifted over time so that it feels like an 8 out of 10 difficulty (where 0 = no effort, 10 = hardest effort you can give)

Authors: Fiataraone Singh, Maria; Hackett, Daniel; Schoenfeld, Brad; Vincent, Heather K.; Wescott, Wayne. 2019

AMERICAN COLLEGE of SPORTS MEDICINE. LEADING THE WAY

Lifestyle Activity

Moderate Activity

- Brisk walking
- Heavy cleaning (washing windows, vacuuming, mopping)
- Mowing lawn (power mower)
- Light bicycling
- Recreational badminton
- Tennis doubles

Vigorous Activity

- Hiking
- Jogging
- Shoveling
- Carrying heavy loads
- Bicycling fast
- Basketball game
- Soccer game
- Tennis singles

A limitation of labeling activities this way is that it does not consider the fact that some people have a higher level of fitness than others. It is important to tailor your activity to your own fitness level.

Guidelines

The recommendation for adults 18-64 years old is to do at least 150-300 minutes of moderate intensity or 75-150 minutes of vigorous intensity activity weekly along with two or more days weekly of strength training. The more physical activity, the more benefit, but any amount of exercise is better than none. Working with a certified exercise specialist such as a kinesiologist, exercise physiologist, physical therapist, or certified personal trainer is the safest and most reliable way to begin an exercise program.

Activity Types

Aerobic or endurance activities include running, swimming, biking, hiking, playing sports, dancing and brisk walking.

Strength or resistance activities include weight lifting, pushing a wheelchair/stroller, kettlebells and body weight exercises such as squats, lunges, pushups, sit-ups etc.

Flexibility activities include stretching and some forms of yoga.

Balance activities include tai chi, qi gong and some forms of yoga.

Warning/Disclaimer: always talk to your doctor before starting a new activity

Activity Goals

Setting a goal is a great way to get started with physical activity. It's easier to achieve positive goals. An example of a positive activity goal is, "I will walk with a friend or family member for at least 20 minutes after dinner, every weekday for the next two months."

Specific - What specific activity would you like to add/change?

Measurable - How much activity, how many sessions?

Attainable - Do you have what it takes to follow through?

Realistic - What can you actually do? (know your limits, start small, build)

Time-Connected - How frequent or how long will you do the activity?

Helpful resources:

exerciseismedicine.org

Walk With a Doc:
walkwithadoc.org

CDC:
cdc.gov/physicalactivity

Find a Trainer Near You:
usreps.org

2019 Physical Activity Guidelines:
health.gov/paguidelines/second-edition/pdf/Physical_Activity_Guidelines_2nd_edition.pdf

ACE Exercise Library:
acefitness.org

AMERICAN COLLEGE OF
Lifestyle Medicine

lifestylemedicine.org

Appendix G

End of Program Student Learning Outcomes

1. **Cultural Competence:**

   Mentor Christian responsiveness and caring to a global culture through sensitivity and competence for patient traditions and values.

   This project was designed to meet a growing concern for the mental health of college students and pre-nursing and nursing students in particular. Depression and anxiety know no cultural boundaries and are a global concern, particularly in our college-aged students. This project was open to any and all pre-nursing and nursing student at Union College. I did not collect race or ethnicity demographics and that was a failure on my part as the research indicates that minorities are underrepresented in research and may also have limited health resources.

   2. **Evidence Based Practice:**

   Translate quality research findings and outcomes to solve problems for quality personalize outcomes.

   The topic of stress, anxiety, and depression among college students and specifically nursing students is not new. Research has shown the importance of a healthy lifestyle, one that includes physical activity, on managing the symptoms of stress, anxiety, and depression. This scholarly research project studied the effect of physical activity on pre-nursing and nursing students. This research contributes to the body of knowledge through a small pilot study and encourages the possibility of further research including collaborating with other colleges and universities. This research provided the participants with the opportunity to increase their physical fitness and to improve their mental health. The results were not dependent on group participation, rather each participant would benefit based on their own level of involvement.

3. Health Promotion:

Propose evidence-based methods that prevent disease and promote human flourishing through the utilization of a wholistic framework to educate and empower healthy lifestyle choices.

This outcome was the cornerstone of this scholarly project. Nursing school is challenging and it is important for the students to formulate healthy lifestyle habits at this time of their life. I used the CREATION Health model as part of my theoretical framework. This model promotes healthy living through several avenues with physical activity as one of them. The participants received twice weekly emails with evidence-based information about physical activity and other healthy lifestyle habits such as nutrition and rest. Depression and anxiety are mental health illnesses and while sometimes may require medication, the inclusion of physical activity in a person's life, is proven to improve depression and anxiety. This project followed the American College of Sports Medicine guidelines for physical activity. However, the frequency was decreased from five days a week to three days a week. This project also used the well validated PHQ-9 and GAD-7 instruments to evaluate depression and anxiety.

4. Patient Centered Care:

Facilitate inter/intra professional healthcare to achieve personalized, compassionate, and coordinated whole person care.

This research had the possibility of including the campus health nurse, the campus mental health counselor, and the campus chaplain, if the need arose. Each participant was informed of the email addresses and phone numbers for these personnel. Each participant has the opportunity to take the knowledge and experience they gained through this intervention and apply it to their practice and how they will care for their future patients. Each participant had the right to drop out at any time without penalty and without giving a reason.

5. Quality and Safety:

Evaluate current evidence and outcomes of practice in health care systems to ensure a just culture that minimizes the risk of harm and promotes safety and quality of care.

This project required a literature review that validated the importance of physical activity in managing depression and anxiety. The literature review also showed how the majority of nursing students do not participate in regular physical activity and the prevalence of depression and anxiety in the student nurse population. The participants were informed of potential risks such as musculoskeletal soreness or injury. The participants also received emails about appropriate stretching and appropriate clothing choices for the various types of weather experienced this spring.

6. Informatics and Innovation:

Analyze healthcare outcomes using knowledge of nursing, computer and information sciences to ethically and innovatively manage data, information, and technology.

This project relied heavily on computer technology. The informed consent and survey were distributed via student email. The participants assigned themselves a codename that linked their data. This information was stored on a password protected computer. The data was only shared with the statistician. The statistician used G*Power software and the R program for statistical analysis. The participants were communicated with via email and were able to log their time and frequency of physical activity via a google form.

7. Teamwork and Collaboration:

Organize effective inter/intra professional teams to promote quality health outcomes and reduce risk.

As mentioned earlier, the campus health nurse, the campus mental health counselor, and the campus chaplain were available to provide mental health support to the participants if they so desired. Going forward, the goal is to collaborate with the athletic director to increase opportunities for physical activity for the student body as a whole. COVID-19 took a mental toll on the students and providing them with opportunities to improve mental health is a current goal. This will also require working with the campus life committee and the campus deans.

8. Professionalism:

Advocate for Christ-centered excellence in nursing roles and professional behaviors throughout the inter/intra professional team.

It is the goal of the researcher to be a role model of a healthy lifestyle to students and this includes a healthy spiritual life. If the participants are able to maintain a healthy balanced life, they are better able to share the gospel with others. They will be a light in this dark world at the power of following Christ's health guidelines as set out by the Seventh-day Adventist denomination. While physical and mental illnesses will never go away until Jesus returns, healthy nurses are able to provide whole person centered care in a professional and non-judgmental manner to their patients.