The Impact of Exercise on Stress from Perceived Academic Load in Undergraduate Nursing

Students

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## Abstract

### Purpose

Everyone experiences stress, but a population that is well known to be impacted by stress are undergraduate nursing students. Nursing program faculty are aware that their students are stressed and despite efforts in place to minimize stress, it continues to be problematic. There is scholarly evidence that exercise improves stress and overall mental health, but it is not a target of stress relief in nursing programs. The purpose of this project is to evaluate if exercise recommendations from the American Heart Association and American College of Sports Medicine will help improve stress, academic load, blood pressure, heart rate and weight in senior, traditional, full-time, undergraduate nursing students at a university in northern New Jersey.

### Methodology

This pilot quasi-experimental study assessed if exercise, specifically racewalking and/or jogging/running for at least twenty minutes, for three days a week, for four weeks reduces stress levels from perceived academic load. The study also evaluated changes in blood pressure, heart rate and weight throughout the intervention. The population includes undergraduate senior nursing students at a university in northern New Jersey on two of its campuses. Participants completed the Student Nurse Stress Index, a validated survey, before and weekly during the intervention. Participants documented their blood pressure and heart rate before and after exercise and their weight before and after the intervention.

### Results

Sixty-two undergraduate, traditional, full-time students (n=62) completed this project in its entirety. The mean of the Student Nurse Stress Index had an 8.53-point decrease in the total

score when comparing preintervention to postintervention. There was a statistically significant decrease in SNSI as the weeks of exercise progressed ($p<.000$). From the four-factor structure of the SNSI, Academic load, Clinical Concerns and Interface worries also displayed a statistically significant decrease after the intervention. Blood pressure and heart rate readings did not have significant changes from the intervention, but rather weight preintervention and postintervention revealed statistically significant results.

**Implications for Practice**

Nursing students should be provided with adaptable opportunities to exercise in order to manage stress. This can be done by creating exercise events or exercise clubs within the nursing program.

**Keywords**

undergraduate student, nurse, stress, exercise, run, jog, race-walk, academic load, clinical, personal problems, interface, blood pressure, heart rate, weight

**Background & Significance**

Undergraduate four-year nursing school programs are known for their negative effect on students' stress levels due to the expected academic load and grueling study hours. They are not only creating an everlasting impression on students during their learning experience, but the lifestyle behaviors practiced during this time are also making a significant impact on their future, and the future of healthcare (Clark & Pelicci, 2011). Patients' interactions are limited in potential because what is encouraged and taught about stress is not reciprocated by the nurse. Nurse burnout, comorbidities that affect work ethic, and overall wellbeing are only a few components that are influenced if colleges do not encourage and provide the opportunity for students to focus on self-care with interventions like exercise (Bryer, Cherkis, & Raman, 2013; Chow & Kalischuk, 2008; Kulavic, Hultquist, & McLester, 2013).

Nursing school course load requires a vast amount of time and commitment from students. This can lead to an overwhelmingly stressful college experience. Compared to other college majors, nursing students are required to be present during more class, laboratory time, as well as clinical hours (Bryer et al., 2013). The trend of the non-existent self-care priority and increased amount of student stress in college students, has led to depression and unfortunately even suicide (Clark et al., 2011). Thirty percent of students that receive counseling during their college experience have had thoughts of suicide, while over eight percent have attempted suicide (Novotney, 2014).

Stress is inevitable and multifaceted. Stress can inspire and assist in saving lives, but too much of anything can also be detrimental. Chronic stress can contribute to a multitude of health problems – heart disease, diabetes, and anxiety (National Institute of Mental Health, 2016; American Heart Association, 2018c). It is a cascade of events - academic stress activates the

sympathetic nervous system, which elevates the cardiovascular response, which results in increased heart rate and blood pressure (Conley & Lehman, 2011). Academic stress was found to be associated with a temporary elevation in systolic blood pressure, especially for students with test anxiety. This daily fluctuation of blood pressure is an indicator for heart disease.

The American Heart Association (2018c) lists items that individuals engage in when trying to relieve stress during periods of increased stress. Overeating to relieve stress is common and an extremely unhealthy habit. Eating to relieve stress leads to weight gain which is another significant contributor to a range of comorbidities such as high cholesterol, diabetes and heart disease (American Heart Association, 2018b). Even though there is raised awareness of the increasing percentage of overweight young adults, the numbers have increased from 29% to 32.5% from 2000-2009 (LaChausse, 2012). Over forty percent of nursing undergraduate students placed themselves in the "overweight" category (Chow et al., 2008).

The emotions that are caused by stress varies from individual to individual, and, therefore how stress is managed is also unique. The National Institute of Mental Health (2016) suggests that in order to manage and prevent stress from becoming dangerous, individuals need to understand what coping interventions will work for them. Examples of ways to handle stressful events or situations include recognizing personal signs, reaching out to a health care provider, ensuring regular exercise, participating in a relaxing activity, making goals and setting priorities, and staying connected socially to supportive members or groups. These interventions can also improve overall stress by the reduction of heart rate and blood pressure (Clark et al., 2011).

The Centers for Disease Control and Prevention (2017) also suggests that taking care of oneself by exercising regularly can help alleviate stress. According to the American College of Sports Medicine and the American Heart Association, the recommendations for exercise for

adults is moderate-intensity cardio or aerobic exercise for at least thirty minutes on five or more days per week, or vigorous intensity of aerobic exercise for at least twenty minutes on three or more days a week (American College, 2014). Although college campuses have accessible facilities for exercise, the American College Health Association reported that only 50.4% of college students meet these guidelines.

The relationship between exercise and the reduction of stress is evident through current literature (Yan et al., 2015). The American Heart Association (2016) explains that exercise improves mental wellness, which is extremely vital in college students. Without being well in all aspects of what stress can influence, both positive and negative, learning becomes tainted (Novotney, 2014). Stress is often measured indirectly by blood pressure and heart rate (Li & Goldsmith, 2012). When comparing physical and mental benefits of yoga in undergraduate students, researchers found that the resting heart rate was significantly affected (Smith, Greer, Sheets & Watson, 2011).

Jones and Johnston (1999) created the Student Nurse Stress Index (SNSI) in order to sufficiently measure perceived sources of stress in nursing students. When creating this survey, they discovered that sources of stress are perceived by the student nurse in four categories: Academic, Clinical, Interface and Personal dimensions. Even though nursing students receive education on health promotion and stress, many student nurses do not implement the lessons learned in their own lives (Bryer et al., 2013). College students, especially nursing students, need programs embedded in the curriculum that promote healthy behaviors regarding stress management (Clark et al., 2011). Creating healthy habits during a pivotal stage in one's life can create sustainable habits that will improve overall wellbeing after college (Clark et al., 2011).

**Problem Statement**

Due to the challenges faced in nursing school, many undergraduate nursing students place exercise at the bottom of their priority list (Bryer et al., 2013). As a result of the effects of stress on learning and well-being, nursing programs must recognize their influence on health promotion and increased stress from perceived academic load. Educating undergraduate nurses about the value of exercise through lecture, about the effects, its relationship with stress, and patient education is not enough for nurses to mimic the behavior into their own personal life. In order to obtain the highest capacity for learning, it is paramount for nursing programs to implement opportunities that foster positive healthy behaviors, such as exercise.

Currently, the fitness center of the university in northern, New Jersey on the Newark campus is at most seven walkable minutes away from the two buildings where a majority of the classes are located for undergraduate nursing students. Despite the proximity to the fitness center, due to their time-consuming schedules, stakeholders in the nursing program need to ensure efforts are in place for students to implement exercise in their lifestyle. Exercise will subsequently improve learning, stress, and provide a routine that students can learn to emulate in the future.

**Needs Assessment**

The influx of stress in nursing students will continue to be a problem decades from now, but the way students are encouraged to manage stress can be improved upon. The number of college students that report that stress negatively impacts their academic achievement is increasing (Bergen-Cico, Possemato & Cheon, 2013). The Center for Collegiate Mental Health reports that in 2012-2013 of students who already receive support through counseling services: 48.7 % attended counseling for mental health concerns; 32.9 % take medication for mental health

concerns; 30.3% have considered suicide; 8.8% have made a suicide attempt (Novotney, 2014).

These alarming statistics illustrate how imperative it is for colleges to make changes toward

assisting students in managing stress.

Stress rates have been increasing yearly in the United States. In 2007, the American

Psychological Association began collecting an annual survey to investigate stress across the

country as a part of the Mind/Body Heath Campaign (American Psychological Association,

2016). The American Psychological Association (2016) reports consistently higher averages of

stress levels in younger generations and women, a population which reflects the majority of

nursing students. Millennials rated their stress level at 6 on a 10-point scale (1 is "little or no

stress" and 10 "a great deal of stress) compared to Boomers who rated their stress at an overall

4.3. The survey results also report that fifty percent of adults reported engaging in exercise that

makes them "sweat or breathe hard at least 2 times a week", but twenty-two percent report never

exercising.

In order for policy makers to understand how to address stress in their particular state, it

is important that they understand what their residents, including nursing students, feel contribute

to their stress. New Jersey does not stand apart from the other states in the country in regards to

level of stress. Over twenty-five percent of New Jersey residents report that they have a

substantial level of stress due to finances, lack of time, and their occupation (Alexander, 2017).

Residents of southern New Jersey report that their stress is primarily due to time and family-

related stress. The findings are gathered from the New Jersey Health and Well-Being Poll which

is conducted by Rutgers Center for State Health Policy. The poll is a section in the Health and

Well-being project which is funded by Robert Wood Johnson Foundation.

Increased stress and anxiety in students are more than eighty percent of the time juggled by the student without the help of supportive services (Bergen-Cico et al., 2013). Many nursing students turn to negative health behaviors such as smoking and alcohol, which at times lead to substance abuse (Clark et al., 2011). Undergraduate nursing students at a university in northern New Jersey need resources on how to manage stress from perceived academic load in an easily adaptable fashion in order to create healthy behaviors for themselves and their future career as nurses.

## Clinical Question

Will nursing undergraduate students at a university in northern New Jersey have reduced stress from perceived academic load after implementing exercise regularly?

PICO(T) question: In senior, traditional, full-time, nursing undergraduate students at a university in northern New Jersey, how does implementing exercise routinely for four weeks compared to previous exercise routine affect stress levels from perceived academic load.

## Aims and Objectives

Stress control can be managed by exercising regularly. Even so, creating lifestyle changes such as implementing exercise into one's daily regimen, can be difficult. The American Heart Association and the American College of Sports Medicine recommends that adults should partake in moderate-intensity cardio or aerobic exercise for at least thirty minutes on five or more days per week, or vigorous intensity of aerobic exercise for at least twenty minutes on three or more days a week (The American College Health Association, 2014).

The primary aim for this project was to determine if exercise based on the American Heart Association and the American College of Sports Medicine recommendations, a stress reduction intervention, was effective in reducing stress from perceived academic load in senior,

traditional, full-time undergraduate nursing students at a university in northern New Jersey – on Newark and New Brunswick campuses.

The secondary aim for this project was to provide an effective stress reduction intervention to stakeholders and faculty members of the Nursing Department at a university in northern New Jersey in order for them to consider implementing adaptable opportunities to exercise for nursing students.

There are four primary objectives of this project:

1. Collect baseline data from undergraduate senior nursing students' level of stress at a university in northern New Jersey during the initial meeting by utilizing a validated and reliable survey - the Student Nurse Stress Index (SNSI) which was developed by Jones and Johnston (1999).

2. Compare and analyze how implementing exercise routinely for four weeks (as recommended by the American Heart Association and American College of Sports Medicine) with undergraduate senior nursing students at a university in northern New Jersey influences stress before routine exercise, after four weeks of routine exercise and weekly with the SNSI.

3. Evaluate how implementing routine exercise (as per recommendations from the American Heart Association and American College of Sports Medicine) in undergraduate senior nursing students at a university in northern New Jersey impacts perceived academic load before routine exercise, after four weeks of routine exercise and weekly. Evaluation of perceived academic load will be measured by the following questions: 1,2,3,8,20,14 and 18 in the SNSI.

4. Measure changes in blood pressure, heart rate and weight, and its relationship with stress levels during four weeks of vigorous intensity exercise (three days a week). Weight will be measured before and after the intervention and will be measured by the participant utilizing their choice of scale. Blood pressure and heart rate will be self-reported on "My Vital Sign Tracker" and will be taken before and at least thirty minutes after exercise as per recommendations form the American Heart Association (2018a).

## Review of Literature

A literature review was conducted in order to explore four considerations about stress, exercise, and academic load in undergraduate nursing students:1. Knowledge about contributors to stress in undergraduate college students; 2. Impact of perceived academic load on stress; 3. Gathering evidence on how physical exercise's influences stress; 4. Programs campaigned to improve stress through exercise in undergraduate students.

The database used was CINHAL and the following search criteria included full text sources published from 2008-2018. The first search identified 83 potential sources with the following key words: *stress control, physical exercise, undergraduate students, wellness, not obesity*. The second set of key words identified 783 potential resources: *stress, undergraduate students, academic achievement*. The third search identified 513 sources with the following key terms: *stress, undergraduate nursing students, academic achievement.*

### Contributors to Stress in Undergraduate College Students

Undergraduate students fall under the adolescent age group, which is the prime time of growth and remodeling – emotionally, physically, sexually, mentally, and intellectually (Rajagopal, Pugazhanthi & George, 2012). During this time of transformation, undergraduate students endure stress that can cause a strain on these changes. In a university in Brazil

researchers explained that common risk factors to stress among students in health care were

revolved around their environment: transport, emotional status, family demographics, location of

the university, work, and lack of leisure activities (Feitosa, dos Santos, De Faria, de Silva & de

Campos 2011). Building resilience rather than attempting to eliminate the unavoidable risk

factors that impact stress may be the best option in managing stress in undergraduate college

students (Hartley, 2011).

Common stressors of undergraduate students include: "fear of failure", time and

academic responsibilities (Bryer et al., 2013; Conley, Travers, & Bryant 2013). Academic stress

from constant evaluations and hours dedicated to complete the degree for health professional

students can cause future occupational burn out and consequently negative health outcomes (Lo,

Francis-Cracknell, & Hassed, 2017; Conley et al., 2013). Negative health complications can lead

to life-threatening diseases such as heart disease and hypertension.

Adams, Meyers, and Beidas (2016) found that undergraduate students with low income

and/or first-generation families have even more specific contributors to stress. Perceived stress is

how an individual acknowledges the imbalance between their demands and coping abilities.

Although financial strain, academic and social integration are evident factors influencing stress

for this population, perceived stress is the most powerful factor. When controlling perceived

stress, financial strain and academic and social integration can be decreased. This is important to

understand because students with low income and/or who are first generation are at the highest

risk of not completing college.

Nursing undergraduate students, report extreme levels of stress in anxiety – especially in

the clinical learning environment (Moscaritolo, 2009). Self-care especially for nursing

undergraduate students by managing stress is crucial not only for the success of the student and

their personal health, but also in practices they become a part of after graduation (Stark, Hoekstra, Lindstrom, Hazel & Barton, 2012). Unfortunately, it has become a growing trend for undergraduate nursing students to have amplified stress levels and overlook self-care (Clark et al., 2011).

**Exercise and Stress**

Physical exercise can be done in any setting, at any time and is an exceptional non-pharmacologic therapy that can assist in relieving stress (Li et al., 2012). Physical exercise releases endorphins, creates neurotransmitter release and activates specific receptors that can improve symptoms from depression, anxiety and stress (Feitosa et al., 2011). Regular exercise is an important factor in minimizing the risk of several diseases such cardiovascular disease and diabetes (Kulavic et al., 2013).

Kotter, Tautphaus, Obst, Voltmer and Scherer (2016) conducted a prospective, longitudinal observational study on medical school students. In their study, they found that self-rated mental stability and overall wellness declined after only one year in medical school. The substantial component that was associated with "good" overall health was simply, routine exercise. Even though, it may seem like common knowledge that exercise improves stress, Feistosa et al. (2011) discovered that out of the fifty-eight nursing students that participated in their study, 67.24% did not engage in any exercise. Exercises that have found to be common among the undergraduate nursing population are walking, cardio, aerobics and weight training (Chow et al., 2008).

When it comes to physical exercise, looking deeper into the motivational aspects and barriers that present with undergraduate students can improve the understanding of how to best approach this population. Kulavic et al. (2013) explored how enrollment of nontraditional and

traditional students differentiated in motivation and barriers to exercise. Nontraditional students included those older than twenty-three, commute to school, and/or have a job with family responsibilities compared to traditional students who were full time students that lived on campus under the age of twenty-two. Nontraditional students were motivated by health reasons while traditional students were motivated by competition, appearance, and recognition.

There has been an abundance of studies evaluating the positive values of yoga. Yoga is a broad term that integrates breathing, posture, strength training, and meditation (Li et al., 2012). Although yoga may reduce stress in nursing students, when the spiritual and ethical pieces of yoga are removed, the exercise alone may not provide as much advantage regarding reduction of stress (Michael, 2017; Smith et al., 2011).

**Academic Load and Stress**

Academic load has been found to be one of the single most influences on student stress (Jacob, Itzchak & Raz, 2013). The increased strain on nursing undergraduate students from the program requirements and tasks, along with the increased stress of other unavoidable and modifiable factors lead to impaired learning (Feitosa et al., 2011). Below average academic performance can be a result of academic load from test anxiety in undergraduate students (Conley et al., 2013). Academic load and stress attribute to fatigue, sleepiness and inability to pay attention efficiently in class (Feitosa et al., 2011). Nursing students report higher levels of anxiety compared to students of other degree programs (Yucha, Kowalski & Cross, 2009).

The best way to measure academic achievement is through grades which is associated with low levels of perceived stress (Jacob & Einstein, 2017). Jacob, Itzchak, and Raz (2013) discussed how the relationship is actually U-shaped – at certain rise in stress is valuable in improving performance, but past the optimal level of stress, the relationship reverses. Trait

anxiety, which is chronic and not specific to triggers may also be a predictor of lower course grades in undergraduate nursing students (Plaiti et al., 2016).

**Programs to Improve Physical Exercise in Undergraduate Students**

Colleges are aware that exercise is beneficial to their students for numerous reasons – better health outcomes and an outlet for targeting stress. Universities have developed various programs in order to promote exercise amongst their students beyond the availability to accessible exercise facilities. Although each class level would benefit from the programs developed, freshmen were the primary focus of many programs because their transition into college can be extremely difficult (Michael 2017). Examples of initiatives are: mHealth, My Student Body, MoveU Leave the Pack Behind, and participACTION let's get moving (Yan et al., 2015; LaChausse, 2012; Scarapicchia, 2015).

Finding opportunities to motivate undergraduate students to perform exercise may change depending on the social culture of the student body. A majority of students own a mobile phone, and subsequently, text messaging to motivate undergraduate students to exercise has potential in cultivating the drive for students to participate in exercise (Yan et al., 2015). Nutritional behaviors, however, have been found to be an easier target to modify as compared to exercise because it is easier to implement in the life of a college student (LaChausse, 2012)

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**Theoretical Framework**

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The theoretical framework that will be used to guide this study is Betty Neuman's System Model (Appendix G). The Neuman's System Model views the individual as dynamic and multidimensional, which is true of an undergraduate nursing student. Each student has various dimensions that make up their being – "physiological, psychological, sociocultural, developmental and spiritual" (Gonzalo, 2011). Bryer (2013) utilized the Pender's Health

Promotion Model in their study, and although they are different theoretical frameworks, it shares a similar premise of the Betty Neuman's System Model. The foundation of both models describes certain perceived variables that allow or disengage an individual in a particular behavior. In the Neuman's System Model, the environment is the complex factor that plays a significant role internally and externally and as each student progresses.

There are three lines in the model that represent a line of resistance, flexible line of defense and a normal line of defense that essentially protect one's energy or stability. When stressors break through the result can improve or deteriorate health outcomes. The Neuman's System Model mirrors undergraduate nursing students' stressors that potentially invade the normal line of defense. When this occurs, stability diminishes, and at this time, lifestyle modifications with exercise can help reinforce the students' flexible line of defense.

## Methodology

This DNP project assessed if exercise, specifically the American Heart Association's recommendation for vigorous intensity aerobic exercise of racewalking and/or jogging/running for at least twenty minutes, for three days a week, for four weeks reduced stress levels from perceived academic load and their effects on blood pressure, heart rate and weight in undergraduate senior nursing students at a university in northern New Jersey in Newark and New Brunswick, NJ (American Heart Association, 2015). In this pilot quasi-experimental pre- and post-test DNP project, senior nursing students enrolled in a university in northern New Jersey were recruited for the study. In the Fall semester of the undergraduate nursing program at a university in northern New Jersey, student volunteers completed a series of surveys. Surveys include: background survey (Appendix B) and the Student Nurse Stress Index (SNSI) (Appendix C).

**Setting**

The setting was in a classroom of seniors in the nursing program in the university in northern New Jersey on two of its campuses-Newark and New Brunswick and thensetting of their choice to conduct the exercise requirement.

**Study Population**

Using a convenience sample, 116 student volunteers were recruited through faculty members and a recruitment flyer (Appendix E). After review, the following completed the project in its entirety: New Brunswick (n=29), Newark (n=33), total (n=62). The goal was to include as many senior nursing students feasible to provide an adequate representation of the target population.

**Inclusion Criteria.**

The students enrolled were senior, traditional, full-time nursing student at the university in northern New Jersey. The average age of a traditional student is between 18-22 years old. In 2015-2016, there were 572 students enrolled as a traditional nursing student at university in northern New Jersey (Rutgers The State University of New Jersey, 2018). The population size of the senior, traditional, full-time undergraduate nursing students that this DNP candidate recruited from was 116 potential participants. Participants needed to have a smart phone with the capabilities of downloading a Global Positioning System (GPS) application. Participants also needed to have access to a scale to measure their weight, access to a blood pressure cuff (manual or automatic), and had to use manual palpation, smart watches or applications on their smart phones to obtain their heart rate.

**Exclusion Criteria.**

Students that had a medical condition which prohibited them from exercising were

excluded via self-reporting through their approval in consenting to participate in the project.

Pregnant women were not permitted to enroll in this project.

**Study Intervention**

Students were provided with information about the project during the initial meeting

where the recommended intervention to be performed for four weeks was discussed. The

intervention that was reviewed was the implementation of the following forms of exercise: race

walking and/or jogging/running. The intervention of racewalking and/or jogging/running was to

be completed at least twenty minutes for three days a week as recommended by the American

Heart Association (The American College Health Association, 2014). Participants were informed

that racewalking and/or jogging/running must not be conducted on an exercise machine except a

treadmill.

The Rutgers Blackboard website was utilized for participants to upload screen shots, the

Vital Sign Tracker and SNSI's weekly. The participants had their own portal to submit their data

and it was not authorized for other subjects to view. This PI was the only individual that had

permission to access the uploads from each participant that was submitted to the Rutgers

Blackboard website. Subjects were assigned a number at the initial meeting which was used to

categorize their uploads on a password protected computer. Once the implementation was

completed and all of the data was categorized the uploads were removed/ disabled on the Rutgers

Blackboard website.

Participants recorded racewalking and/or jogging/running in a Global Positioning System

(GPS) application of their choice. The three workouts were uploaded weekly as a screen shot to

the password protected website Rutgers Blackboard and included time, distance, and type of workout the participant completed. In order to utilize a free GPS application each participant had to create an account to include their full name and allow access to their location for tracking. Additional information such as gender, height and weight are optional. Examples of free applications and an example of a screen shot of a workout was provided during the initial meeting and on the Rutgers Blackboard website (Appendix H).

Participants were provided with a blank calendar titled "My Vital Sign Tracker" during the initial meeting (Appendix D). Blood pressure and heart rate was self-reported on days on exercise and was taken before exercise and at least thirty minutes after exercise as per recommendations from the American Heart Association (2018a). Weight in kilograms was self-reported and recorded at the beginning of the intervention on "My Vital Sign Tracker" and after the intervention was completed for four weeks. Students weighed themselves and utilized a scale of their choice. After each week of implementing the selected exercise into their daily routine, the participants retook the SNSI to reflect weekly stress levels. The "My Vital Sign Tracker" and SNSIs were uploaded weekly to the Rutgers Blackboard website. Each participant completed five SNSIs through the entirety of this project. A final meeting occurred after the four-week intervention, where the PI collected the "My Vital Sign Tracker" and SNSIs that were not submitted electronically.

**Outcome Measures**

The Student Nurse Stress Index (SNSI), a validated and reliable tool was used in the project preintervention and weekly during the four-week intervention (Appendix C). The SNSI was created by Jones and Johnston (1999) and includes questions in its four-factor structure that reflect Academic Load, Clinical Concerns, Interface Worries and Personal Problems. The SNSI

was also used in an aforementioned study by Yucha and colleagues (2009) to evaluate the stress and academic performance of nurses in a home hospital experience. Each SNSI takes approximately ten minutes to complete.

Background information was also obtained along with the pre-test during the initial meeting with the participants (Appendix B). Background information included brief demographics, how often exercise was performed and evaluation of what is used to manage stress.

**Risks or Harms**

The physical risk of participating in this project was injury due to implementing aerobic exercise. This was mitigated by ensuring participants were clear that consenting to the project was their self-reported approval that they are medically able to exercise. Another way that injury was mitigated was through providing a choice of two exercises (race-walking and jogging/running) that can be done safely at their own physical capability for vigorous intensity exercise as recommended by the American Heart Association. Students were recommended to utilize the university's Student Health Services in their respective campuses if an injury occurred during the implementation of this project.

**Subject Recruitment**

Using a convenience sample, student volunteers were recruited with flyers that was distributed via school email, flyers posted on campus and a recruitment meeting. Team member, Dr. Prado was teaching all of senior undergraduate nurses in the Fall Semester of 2018. This PI met with her class at the end of their scheduled class time for a recruitment meeting in order to introduce myself, the project details, hand out the flyers and announce the initial meeting date and time. The initial meeting date and time was also scheduled on a date that Dr. Prado's class

met for the convenience of the subjects. Dr. Prado and this PI reinforced to the students that the

project is completely voluntary, would not affect their grade and was not related to their course

work. It was stated on the flyer and made clear during the recruitment meeting that attending the

initial meeting was mandatory if the student wanted to enroll in the project, but their attendance

to the meeting did not mandate them to enroll.

**Consent Procedure**

The consent was created by using the Rutgers IRB suggested template. It was tailored to

reflect the aims and objectives of this project (Appendix A). During the initial meeting students

were provided the opportunity to ask questions pertaining to the project. After clearly

communicating the aims and objectives and answering questions, students were able to choose to

participate or to not participate. Student volunteers were reassured that academic standing would

not be influenced. Students were assured that they can withdraw from the project at any time.

**Subject Costs and Compensation**

There was no cost to subjects by this principal investigator for the subjects to participate

in this project. For participating in the project, participants were placed in a drawing for a FitBit.

The drawing occurred at the final meeting after the four weeks of the intervention were

completed. The subjects' assigned numbers were placed in a bag where one number was drawn.

The Fitbit was given to a participant whose number was drawn at the final meeting.

**Project Timeline**

Gantt chart (Appendix F)

1. Question development – 12/5/2017

2. Proposal development and submission to Chair and Team member – 1/22/2018

3. IRB submission process – 7/10/2018, modification 10/24/2018

4. Recruitment meeting – 10/02/2018, 10/04/2018

5. Initial meeting with subjects – 10/09/2018, 10/11/2018

6. Intervention – 10/28/2018-11/25/2018

7. Closing meeting – 12/14/2018, 12/18/2018

8. Data Analysis – 12/18/2018

9. Project Presentation – 1/28/2019

**Resources Needed/Economic Consideration**

The project's budget was $134.95

Budget listing as follows:

1. Fitbit: $119.95

2. 116 folders: $15.00 on Amazon

### Evaluation Plan

Surveys were conducted at five points in time - during the initial meeting and once a week for four weeks. The background survey was completed one time during the initial meeting. Blood pressure and heart rate were self-reported twice, before and after exercise. Weight in kilograms was self-reported at the beginning and the end of the intervention. Submissions weekly of workouts, "My Vital Sign Tracker", and SNSIs was submitted through the password protected website, Rutgers Blackboard. My Vital Sign Tracker and SNSIs not completed electronically was collected at the final meeting.

**Data Maintenance/Security**

Written consents were secured in the Stanley S. Bergen Building, Room 1135 which is a locked office on School of Nursing campus of the university in northern New Jersey. Folders and handouts were numbered and students' names was not collected during the data collection.

Surveys were inputted into a secured password protected computer using an excel spread sheet

by this principal investigator until the completion of the project. The data will be deleted and

destroyed after at least six years after the closure of this project according to the Rutgers policy.

**Data Analysis**

Data analysis was conducted with the SPSS, Version 22. Data analysis included the

following data: background survey, Student Nurse Stress Indexes, blood pressure and heart rates

before and after exercise, and weight before and after the four-week intervention.

The demographics were combined for both campuses and the following variables were

utilized: age, employment, credits, housing, the number of times exercised on a weekly basis and

stress management interventions. The categorical variables - age, credits, and the number of

times exercised, were analyzed using the mean and standard deviation. The continuous variables

- employment, housing, and stress management interventions were described using frequency.

The Student Nurse Stress Index (SNI) was collected five times throughout the study: pre-

intervention and weekly for four weeks. Data analysis provided information on weekly changes

of participants' stress levels, changes weekly identified from the four-factor structure in the SNSI

(academic load, clinical concerns, personal problems and interface worries), and significant

differences in the change of stress levels according to specific campus.

When performing the analysis of the data obtained from the SNSI, this Likert-type scale

was considered as interval data, despite the controversy about its level of measurement (ordinal

or interval). Time/ weekly intervals were considered the independent variable, while the four-

factor structure and the overall SNSI total value were the dependent variables. Descriptive

statistics of the total SNSI and the four-factor structure was analyzed weekly. The one-way

repeated measures ANOVA statistical analysis was used for SNSI, Academic Load, Personal

Problems and Interface Worries. The Friedman Test was used to analyze Clinical Concerns as

the data was not normally distributed. The comparison of campus and SNSI was analyzed using

the mixed ANOVA statistical analysis.

Blood pressure and heart rate were obtained before exercise and at least thirty minutes

after exercise. Weight was obtained before the intervention and post intervention. Data analysis

was used to identify if there was a significant change in blood pressure and heart rate as the

individual exercised throughout the implementation phase of the study and if there was a

significant change in weight after the intervention was complete. Blood pressure and heart rates

taken before exercise was used as resting vital signs. Blood pressure was separated into systolic

and diastolic rates. Time/daily intervals was the independent variable and the systolic blood

pressure, diastolic blood pressure and heart rate were the independent variables. Descriptive

statistics were used to describe the resting blood pressure and heart rate values. The one-way

repeated measures ANOVA was used to analyze changes on a daily interval as exercise was

implemented three times a week for four weeks in the participants' life. Change in weight before

and after the intervention was analyzed using the Wilcoxon Signed Ranks test as the data was not

normally distributed.

## Findings

The results presented represent two campuses from a university in northern New Jersey.

There was a total of 116 students collectively recruited from the two campuses, (n= 51) from

New Brunswick and (n=40) from Newark, with total of (n=91). After the implementation phase,

data was reviewed and the following students completed the project's requirements in full: New

Brunswick (n=29), Newark (n=33), total (n=62).

The background survey, or demographics of the participants was analyzed using descriptive statistics (Appendix I, Figure 1). The average age of the participants was 21.82 years old, 74% were employed, and took on average 14.05 credits during the Fall semester of their senior year of the four-year undergraduate nursing program. In regards to housing, 59.7% lived at home with family, 16.1% lived in dormitories and 22.6% lived off campus with non-relatives. Exercise was performed an average of 2.17 times weekly and when asked the stress management intervention of choice, exercise was mentioned 23 times.

The total SNSI's descriptive statistics displayed a decrease in the average SNSI as the weeks of exercise increased (Appendix J, Figure 2.)  The total SNSI scores can range from 22-110. The pre-intervention total SNSI (M=62.18, SD=14) decreased to (M=53.65, SD=17.69) after week four, which is an 8.53 point decrease overall (Appendix J, Figure 3). The four-factor structure of the SNSI was also evaluated using descriptive statistics (Appendix J, Figure 4). The Academic Load and Clinical Concerns scores had a 4.18- and 2.27-point decrease in the means respectively from pre-intervention to week 4. Personal Problems and Interface Worries had varying increase and decrease in mean scores as the weeks progressed.

Utilizing the one-way repeated measures ANOVA statistical analysis, a $p$ value of $\leq 0.05$ was considered statistically significant. Using the one-way repeated measures ANOVA with a Greenhouse-Geisser correction, the mean scores for the SNSI was statistically significant weekly $(F(2.329, 142.053)=21.598, p <.000)$ (Appendix J, Figure 5). Using the same statistical analysis the four-factor structure displayed statically significant results for Academic Load $(F(2.850, 172.828)=27.959, p <.000)$. Interface Worries and Clinical Concerns also received statistically significant results. Interface worries was analyzed with the one-way repeated measures ANOVA, as seen in Appendix J, Figure 5, while Clinical Concerns was analyzed with Friedman with a

post hoc analysis with Wilcoxon signed-rank test (Appendix J, Figure 6). The pairwise

comparisons were used to analyze if the SNSI, and its four-factor structure results were

statistically significant between specific times it was completed. There were statistically

significant results amongst the times the survey was taken for the total SNSI, Academic Load,

Interface Worries and Clinical Concerns.

The mixed ANOVA analysis was used to compare SNSI levels between the two

campuses in Newark and New Brunswick, NJ. The pairwise comparison was statistically

significant (F(2.403, 144.165)=21.141, $p$ <.000) (Appendix J, Figure 8). Appendix J, Figure 9

and 10 both depict the sizable difference of stress levels, where Newark has a higher total SNSI

as compared to New Brunswick in the five SNSIs submitted.

Blood pressure and heart rate was obtained twelve time during this DNP project and was

analyzed using descriptive statistics. Appendix K, Figure 11 is a list of each day's means

separated by systolic blood pressure, diastolic blood pressure and heart rate. Figure 12 and 13 in

Appendix K, are plots of each day's value of blood pressure and heart rate along with the mean.

As seen in these plots, there does not appear to be a distinct or visible increase or decrease in

resting blood pressure or heart rates as exercise was implemented in participants' lives. Utilizing

the one-way repeated measures ANOVA statistical analysis, a $p$ value of $\leq 0.05$ was considered

as statistically significant. Using the one-way repeated measures ANOVA with a Greenhouse-

Geisser correction, the mean scores for the systolic blood pressure, diastolic blood pressure and

heart rate was found to not be statistically significant (Appendix K, Figure 14).

The Wilcoxon Signed Ranks Test was used to analyze the weight, which was measured

pre-intervention and after week 4 (post-intervention). This test showed that a four week, three

times a week exercise of race walking, running/jogging did elicit a statistically significant change

in weight (Z=-3.654, *p*= .000) (Appendix K, Figure 15). The ranks analysis explains that 35

participants had a decrease in weight after the fourth week, 10 had an increase in weight and 17

stayed the same.

## Discussion

Nursing students are in desperate need of support of their self-care practices due to their

high levels of stress as clearly seen in the SNSI levels taken pre-intervention (Clark et al., 2011).

Exercise is a well-known tool in self-care and in managing many psychological ailments,

including stress (National Institute of Mental Health, 2016). Despite there being no statistically

significant change in the Personal Problems component of the four-factor structure of the SNSI,

the total SNSI, and the remaining three factors did have statistically significant results when

exercise specifically race walking, running/jogging was implemented three times a week for

twenty minutes, for four weeks. Academic load, as seen in Appendix J, Figure 4, provided a

significant amount of stress for senior nursing students within this nursing program, as it does for

many other health care students (Jacob, et al., 2013).

The American Heart Association's (2015) recommendation for vigorous intensity aerobic

exercise was utilized in this study and the exercise chosen was selected for two reasons. The

exercise race-walking and/or jogging/running was chosen to decrease variability and it is an

exercise of choice among the undergraduate nursing population (Chow et al., 2008). The results

of this project explain that this specific, vigorous intensity aerobic exercise completed as

recommended, was a self-care practice that successfully decreased undergraduate senior nursing

students' overall stress levels which supports the idea of creating sustainable practices for their

future profession as nurses (Clark et al., 2011).

In regards to vital signs, Conley (2011) discuss in their study that stress triggers the influx of systolic blood pressure. Throughout the four weeks/12-day intervention, there was no statistically significant changes in overall systolic blood pressure. Although, getting regular exercise can reduce stress, this project's results suggest that race-walking and/or running/jogging three times a week, for twenty minutes, for four weeks may not be influential in decreasing systolic blood pressure in this particular population (National Institute of Mental Health, 2016).

An aim of this project was to evaluate if exercise is an effective stress relieving intervention for undergraduate senior nurses. The secondary aim was to provide the information in this study to stakeholders in the nursing department in order for them to implement adaptable opportunities for students to exercise. The four objectives of this study were met appropriately. Baseline stress levels were collected using a validated tool, stress levels were analyzed as the weeks of exercise progressed, perceived academic load was measured and analyzed weekly, blood pressure and heart rate were taken before and after exercise and weight was taken and before and after the intervention.

The key facilitators in the study were monumental in the success of this project. The project's chair and team member served as supporters and provided sound advice in regards various stages of this project - PICO(T) development, literature review, proposal writing, implementation and the data analysis. The team member allowed this DNP student to enter her classrooms to recruit, sign consents and inform students of the study and its requirements. Dr. Delloiacono and Ms. Viray allowed this DNP student to sign out blood pressure cuffs from their respective campuses. Dr. Chao and Dr. Zha were helpful in providing guidance while this DNP student was completing the data analysis portion of this project.

One of the barriers that impacted one of the project's objectives was obtaining manual blood pressure machines. This DNP student was not aware that students did not receive a blood pressure machine when completing clinical hours. Once this was made known, the DNP team stepped in and was able to help coordinate with each campus' educational centers. The coordinating individuals at the Newark and New Brunswick campuses were more than willing for this DNP student sign out the blood pressure machines needed to complete the study.

An unintended consequence that occurred in this project was the development of a Blackboard module that was not under the team member's classroom modules. The reason this was developed was because it became known that it was unclear to many students as to where uploads were supposed to be located on the website. This unintended consequence was positive because this DNP student was able to review data weekly as they were uploaded and was also able to send reminders to participants throughout the intervention phase of the study.

## Implications

### Clinical Practice

This study provides an increased body of knowledge about exercises' effects on stress reduction. Although this study was not completed in a clinical setting, if students learned to incorporate exercise in their lifestyle as a self-care practice, their future in healthcare in clinical settings can be improved upon. The result of exercise as a routine in a nursing students' life may lead to lower incidences of the development of comorbidities and improved work ethic.

### Healthcare Policy

Healthcare policy may be influenced through raising awareness about self-care through exercise. Although health care stakeholders are aware that exercise is important and that stress is inevitable, this study can increase awareness specifically targeted to undergraduate nursing

students. Raising awareness that exercise can reduce undergraduate student nurse stress can

assist health care stakeholders in creating policies that are mandated on campus.

**Quality and Safety**

In regards to the quality and safety of healthcare, if future nurses continued to exercise

their quality of work may improve. This may result in a decrease likelihood of medical errors

and nurse burnout due to a reduction of stress.

**Education**

One of the aims of this project was to share the knowledge obtained about exercises'

effects on stress levels, specifically of a component of the SNSI, academic load. This

information will be shared with stakeholders and nursing faculty members within the nursing

program at a university in northern New Jersey. If professors understood the importance of this

stress relieving activity, they may be more willing to help students create easily adaptable

opportunities where and when exercise can be conducted. It also increases their knowledge on

other facets of stress that may influence their students, such as personal problems, clinical

concerns, and interface worries.

**Sustainability**

This pilot study focused on senior undergraduate nursing students. Future research can

increase the statistical significance if the power was greater by increasing population size and

including all grade levels. In order to increase the reliability and validity in future research,

another suggestion is that the amount of exercise sessions is increased to greater than four weeks

as seen during the implementation phase of this study. In hopes to reduce variability from

extraneous factors the influence stress, the last recommendation is that future studies utilize a

control and experimental group in order to sufficiently compare student stress levels between

students that exercise and students that do not exercise.

**Translation**

Data will be presented to stake holders and professors of this university in Northern New

Jersey during the DNP project presentation and during Poster Day in poster format.

**Dissemination**

Subjects will be informed of the results of the project in the final semester in a classroom

setting by two professors that teach all of the senior nursing students in their respective

campuses. Subjects will also have access to this DNP student's project through the online

repository provided by the university.

**Professional Reporting**

This paper will be shared to the professional community through scholarly publications

and poster presentations at conventions.

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**Appendix A**

**CONSENT TO TAKE PART IN DNP PROJECT**

**TITLE OF PROJECT:** "The Impact of Exercise on Stress from Perceived Academic Load in Undergraduate Nursing Students

**Principle Investigator:** Felicia Kelly Desai, RN-BC

Hello! I am Felicia K. Desai and I am a doctoral nursing student at Rutgers School of Nursing. You are being asked to participate in a study that I am conducting as a part of my final DNP project.

**<u>Purpose of the Study:</u>**

The purpose of this study is to evaluate if exercise reduces stress from perceived academic load in undergraduate, traditional, full-time, senior nursing students in Rutgers School of Nursing in Newark / New Brunswick, New Jersey. A traditional student is a student between the age of 18-22 years old who enrolled directly into the nursing program after high school and attends school full-time. After analyzing the results from this study, feedback will be given to stakeholders in order to create opportunities to improve stress amongst student nurses.

**<u>Who may take part in this study and who may not?</u>**

- ✓ Traditional, full-time, senior undergraduate nursing students at Rutgers University, in Newark /New Brunswick New Jersey.

- ✓ Must have a smart phone with the capabilities of downloading a Global Positioning System (GPS) application.

- ✓ Must have access to a scale to measure your weight.

- ✓ Must have access to a blood pressure cuff (manual or automatic).

✓  Must be able to obtain heart rate through manual palpation, smart watches or

applications on your smart phone.

*Pregnant students will not be eligible to enroll in this study

*Individuals with medical conditions that prohibit them from performing the selected exercise of

race-walking, jogging/running will not be eligible to enroll in this study.

**How long will the study take and how many subjects will take part?**

The study will take approximately five weeks to complete. This includes the initial meeting

before the intervention begins and the closing meeting after the intervention is completed. You

are one of approximately 116 subjects eligible to participate in this study.

**What will be done?**

After completing the informed consent, you will complete an anonymous background

survey with 6 questions. The purpose of these questions is simply to collect information

regarding demographics, your exercise regimen and how you currently manage stress. The

Student Nurse Stress Index (SNSI) will then be given to you. The SNSI is a validated and

reliable tool that evaluates academic load, clinical sources, interface worries and personal

problems.

After the completion of the first SNSI it will be collected (1 out of 4 SNSI that will be

completed during this study) and the recommendations from the American College of Sports

Medicine and the American Heart Association will be discussed. One example of the

recommendations for adult exercise is vigorous intensity of aerobic exercise for at least twenty

minutes for at least three days of the week. The exercise selected for this study will be

racewalking and jogging/running for at least twenty minutes for three days a week for four

weeks. Racewalking and jogging/running must not be performed on any exercise machine except

a treadmill. Workouts will be recorded in a Global Positioning System (GPS) application of your choice. Three workouts will be uploaded weekly as a screen shot to the password protected website, Rutgers Blackboard. Uploads will include time, distance, and type of workout the participant completed. Examples of free applications and an example of a screen shot is provided at the end of this consent.

You will be given a blank calendar titled "My Vital Sign Tracker". Blood pressure and heart rate will be self-reported on the "My Vital Sign Tacker" for each day that exercise is performed before exercise and at least thirty minutes after exercise as per recommendations by the American Heart Association. Weight in kilograms is to be added on the "My Vital Sign Tracker" before implementation of the exercise routine and at the end of implementation after four weeks of exercise. You will need to weigh yourself using the scale of your choice. After each week during the implementation of exercise, you will retake the SNSI to reflect weekly stress levels. The "My Vital Sign Tracker" and SNSIs will also be uploaded weekly to the Rutgers Blackboard website along with the screenshots of workouts completed. At the final meeting the "My Vital Sign Tracker" and the SNSIs (four out of the five completed) will be collected.

The Rutgers Blackboard website will be utilized for you to upload the screen shots, the Vital Sign Tracker and SNSI's weekly. You will each have your own portal to submit your data and it will not be authorized for other subjects to view. This PI will be the only individual that will have permission to access the uploads from each participant that is submitted to the Rutgers Blackboard website. You will be assigned a number at the initial meeting which will be used to categorize the uploads on a password protected computer. Once the implementation phase of the

project is complete and all of the data has been categorized, the uploads will be removed/

disabled on the Rutgers Blackboard website.

This will provide me with information to analyze if a recommended exercise/week

routine is influential in decreasing stress, improving perceived academic load and its effects on

blood pressure, heart rate and weight in senior, traditional, full-time undergraduate nursing

students. Participation in this project is voluntary.

**Risks or Discomforts:**

To participate in this project, you will be asked to exercise. By consenting to this project,

you are self-reporting that you are medically able to exercise. You will be recommended to

utilize the Rutgers Student Health Services in Newark and New Brunswick, New Jersey if an

injury occurs during the implementation of this project. As a student, there is no risk to your

grade. You will not be penalized in any way for choosing not to participate in the project.

**Benefits of this Project:**

The influx of stress in nursing students will continue to be a problem decades from now,

but the way students are encouraged to manage stress can be improved upon. The benefit of

participating in this project is being able to provide stakeholders a possible effective stress

reduction intervention for their current and future nursing students. Examples of how

stakeholders could improve physical exercise amongst student nurses are: increasing

opportunities to exercise to nursing campuses, improving awareness of exercise facilities on

campus, and encouraging physical events such as school sponsored runs.

**Confidentiality:**

Written consents will be secured in a locked office, on the Rutgers School of Nursing

campus. Folders will be numbered and students' names and personal identifiers will not be

collected during the data collection. Surveys will be inputted into a secured password protected

computer using an excel spread sheet by this PI until the completion of the project. The data will

be deleted and destroyed six years after the project closes, as per the Rutgers policy.

**Compensation:**

Participants will be placed in a drawing for a Fitbit. The drawing will occur at the final

meeting after the four weeks of the intervention have been completed. The drawing will be done

during the final meeting where the subjects' assigned numbers will be placed in a bag and one

number will be drawn. The Fitbit will be given to the participant whose number was drawn at the

final meeting.

**Withdrawal:**

Your participation is voluntary. You are free to withdraw your participation from this

project at any time. Student grades will not be affected by participation or non-participation. If

you do not want to enter the project or decide to stop participating, your relationship with the

project staff will not change. You may withdraw without penalty and without loss of benefits to

which you are otherwise entitled.  You may also withdraw your consent for the use of data

already collected about you, but you must do this in writing to Felicia Desai, 1224 Roosevelt

Avenue, Carteret NJ 07008.

**How the findings will be used:**

The results of this project can illustrate to stakeholders the importance of campaigning

for fitness amongst nursing students. This can be done by the implementation of programs,

classes or groups that are embedded in the nursing program that coordinate with their demanding

schedules. Bringing exercise opportunities to nurses that are easily adaptable to their schedules

can also be done by providing classes within the walls of their classrooms.

**Review of tasks for the participant:**

| Task | Information about Task | Duration |
|---|---|---|
| Background Survey | Complete and turn in back ground survey during initial meeting | 5 minutes |
| Student Nurse Stress Index | 1. During initial meeting (will be collected during meeting) 2. After week 1 of exercise 3. After week 2 of exercise 4. After week 3 of exercise 5. After week 4 of exercise<br><br>Completed four SNSIs will be collected at the final meeting and will be uploaded to Rutgers Blackboard weekly. | 10 minutes to complete SNSI 5 minutes for weekly uploads |
| Exercise | 1.Race-walking and or jogging/running for at least 20 minutes, three times a week for four weeks. 2. Screen shot of the race-walking and or jogging/running exercise that will be recorded in a Global Positioning System (GPS) application of your choice must be uploaded to the Rutgers Blackboard weekly. | 20 minutes per workout 5 minutes for each weekly upload |
| Weight | Obtain weight in kilograms utilizing a scale of your choice before implementation of the exercise routine and at the end of implementation after four weeks of exercise (total of 2 times). Document weight twice on "My Vital Sign Tracker" | 5 minutes |
| Heart rate and Blood pressure | Obtain heart rate through manual palpation, smart watch or application on smart phone. Obtain blood pressure with manual or automatic blood pressure machine. To be collected before exercise and at least thirty minutes after exercise. Document heart rate and blood pressure on "My Vital Sign Tracker" on days exercise is completed. | 2 minutes for heart rate, 5 minutes for blood pressure |
| Upload My Vital Sign Tracker | Upload "My Vital Sign Tracker" weekly (four uploads) Tracker will be collected at the final meeting. | 5 minutes for each upload |

**Example of FREE Global Positioning System (GPS) applications:** MapMyRun, Fitbit

(Mobile Tracker version does not need a Fitbit to function, MapMyWalk, RunKeeper, Runtastic,

NikeRun, Walkmeter GPS Pedometer by Abvio

**Information needed to utilize GPS applications include**: Creating an account to include full

name. Allowing access to your location in order for the application to track your location.

Additional information such as gender, height and weight are optional. Three workouts will be

uploaded weekly as a screen shot to the Rutgers Blackboard website to include **time, distance,**

**and type of workout** completed.

**Example screenshot:**
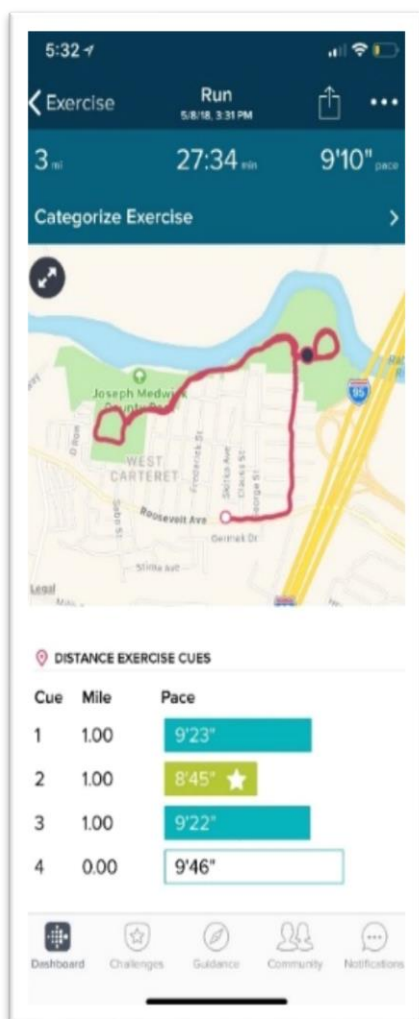
**Agreement to Participate**

**1.  Subject consent:**

I have read this entire form, or it has been read to me, and I believe that I understand what has been discussed.  All of my questions about this form or this project have been answered.  I agree to take part in this project.

Subject Name:

Subject Signature:                                    Date:

**2.  Signature of Investigator/Individual Obtaining Consent:**

To the best of my ability, I have explained and discussed the full contents of the project including all of the information contained in this consent form.  All questions of the subject and those of his/her parent or legally authorized representative have been accurately answered.

Investigator/Person Obtaining Consent (printed name):

Signature:                                    Date:

**Contact Information:**

If you have concerns or questions about this project, please contact the Principal Investigator,

Felicia K. Desai, 551-358-3230, fkishun@sn.rutgers.edu

**Appendix B**

Background Survey

| Question # | Question | Inclusive Rationale |
|---|---|---|
| 1. | What is your age? Choices: 18 19 20 21 22 | To identify age differences in stress levels and exercise routine. |
| 2. | Are you currently employed Choices: Yes No | To distinguish if stress or exercise routine is influenced by employment. |
| 3. | How many credits are you currently taking? Choice: _____ | To analyze school load and its influence on stress and amount of exercise completed weekly. |
| 4. | What is your housing situation? Choice: Dormitory Off-campus housing alone Off-campus with non-relative roommates Off-campus housing with family Other | To assess if housing influences stress and amount of exercise completed weekly. |
| 5. | How often do you exercise on an average weekly basis? Choices: 0 days 1 day 2 days 3 days 4 days 5 days 6 days 7 days | To assess average weekly exercise routine before and after the intervention. |
| 6. | What do you do in regards to stress management? | To assess stress management techniques. |

**Appendix C**

**Student Nurse Stress Index (Pre/Post Test Questions)**

Below is a list of items that may be associated with stress by nursing students, such as yourself. While answering the following questions, think of the last week and your role as a student. For each item, please circle the rating that applies to you. Answer all 22 items.

| | ITEM | NOT STRESSFUL | | | | EXTREMELY STRESSFUL |
|---|---|---|---|---|---|---|
| 1 | Amount of classwork material to be learned | 1 | 2 | 3 | 4 | 5 |
| 2 | Difficulty of classwork material to be learned | 1 | 2 | 3 | 4 | 5 |
| 3 | Examination and/or grades | 1 | 2 | 3 | 4 | 5 |
| 4 | Fear of failing a course | 1 | 2 | 3 | 4 | 5 |
| 5 | Attitudes/expectations of other professionals towards nursing | 1 | 2 | 3 | 4 | 5 |
| 6 | Lack of free time | 1 | 2 | 3 | 4 | 5 |
| 7 | College/School response to student needs | 1 | 2 | 3 | 4 | 5 |
| 8 | Fear of failing a course | 1 | 2 | 3 | 4 | 5 |
| 9 | Actual personal health problems | 1 | 2 | 3 | 4 | 5 |
| 10 | Physical health of other family members | 1 | 2 | 3 | 4 | 5 |
| 11 | Relationships with parents | 1 | 2 | 3 | 4 | 5 |
| 12 | Other personal problems | 1 | 2 | 3 | 4 | 5 |
| 13 | Relations with other professionals | 1 | 2 | 3 | 4 | 5 |
| 14 | Too much responsibility | 1 | 2 | 3 | 4 | 5 |
| 15 | Lack of timely feedback about performance | 1 | 2 | 3 | 4 | 5 |

Answer the following items in regards to your clinical experience:

| | ITEM | NOT STRESSFUL | | | | EXTREMELY STRESSFUL |
|---|---|---|---|---|---|---|
| 16 | Client attitudes towards me | 1 | 2 | 3 | 4 | 5 |
| 17 | Client attitudes towards my profession | 1 | 2 | 3 | 4 | 5 |
| 18 | Atmosphere created by teaching staff | 1 | 2 | 3 | 4 | 5 |
| 19 | Relations with staff in the clinical area | 1 | 2 | 3 | 4 | 5 |

Other academic and related items:

| | ITEM | NOT STRESSFUL | | | | EXTREMELY STRESSFUL |
|---|---|---|---|---|---|---|
| 20 | I am not sure what is expected of me | 1 | 2 | 3 | 4 | 5 |
| 21 | I have no time for entertainment | 1 | 2 | 3 | 4 | 5 |
| 22 | I do not have enough time for my family | 1 | 2 | 3 | 4 | 5 |

**Appendix D**

# My Vital Sign Tracker

On dates exercised write in blood pressure and heart rate before and at least 30 minutes after exercise in its respective box. Choice of exercise: racewalking and/or jogging/running.

**Reminders:** Record weight in kilograms on the first day of exercise and on the last day of exercise. Complete Student Nurse Stress Index (SNSI) weekly. Upload workouts, SNSIs and this calendar **weekly.** This will be collected at the final meeting.

Atlas of a Student Nurse Brain
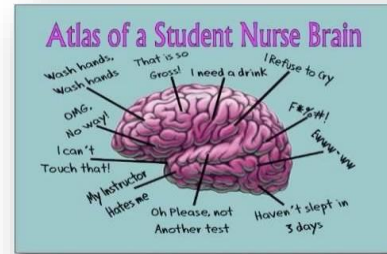
| SUNDAY | MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY | SATURDAY |
|---|---|---|---|---|---|---|
| EXAMPLE<br>HR: 65<br>BP: 120/80<br>HR:62<br>BP:126/88 | 22<br>WEIGHT: | 23 | 24 | 25 | 26 | 27 |
| 28<br>START! | 29 | 30 | 31 | 1 | 2 | 3<br>Complete SNSI and upload workouts* |
| 4 | 5 | 6 | 7 | 8 | 9 | 10<br>Complete SNSI and upload workouts* |
| 11 | 12 | 13 | 14 | 15 | 16 | 17<br>Complete SNSI and upload workouts* |
| 18 | 19 | 20 | 21 | 22 | 23 | 24<br>*Complete SNSI and upload workouts*<br>WEIGHT:<br>END! |

**Appendix E**

**Appendix F**

**Gantt Chart**

| | 3/6 | 6/14 | 9/22 | 12/31 | 4/10 | 7/19 | 10/27 | 2/4 | 5/15 | 8/23 |
|---|---|---|---|---|---|---|---|---|---|---|
| Question Development | | 12/5/2017 | | 58 | | | | | | |
| Proposal Development | | 1/22/2018 | | 128 | | | | | | |
| IRB submission Procress | | 5/1/2018 | | | 176 | | | | | |
| Recruitment | | 10/2/2018 | | | | 2 | | | | |
| Initial Meeting | | 10/9/2018 | | | | 2 | | | | |
| Intervention | | 10/28/2018 | | | | | 28 | | | |
| Closing Meeting | | 12/14/2018 | | | | | 4 | | | |
| Data Analysis | | 12/18/2018 | | | | | 19 | | | |
| Poster and Presentation | | 1/20/2019 | | | | | 85 | | | |

**Appendix G**



**FIGURE 1-3.** The Neuman Systems Model. *(Original diagram copyright © 1970 by Betty Neuman.)*

**Appendix H**

**Example of FREE Global Positioning System (GPS) applications**

- MapMyRun

- FitBit (Mobile Tracker, you do not need a FitBit for this application)

- MapMyWalk

- RunKeeper
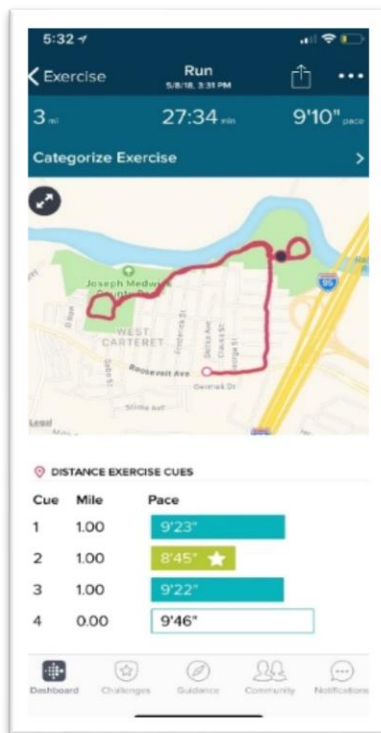
- Runtastic

- NikeRun

- Walkmeter GPS Pedometer by Abvio



**Information needed to utilize GPS applications include**:
Creating an account to include full name. Allowing access to your location in order for the application to track your location. Additional information such as gender, height and weight are optional.

Three workouts will be uploaded weekly as a screen shot to the Rutgers Blackboard website to include **time, distance, and type of workout** the participant completed.

**Appendix I**

**Figure 1. Descriptive Statistics, Measure: Background Survey**

| Variable | Mean | Standard Deviation | Frequency/ Percentage |
|---|---|---|---|
| Age | 21.82 | 2.392 | n/a |
| *Employment* | | | |
|    Not employed | n/a | n/a | 25.8% |
|    Employed | n/a | n/a | 74.2% |
| Credits | 14.05 | 2.1579 | n/a |
| *Housing* | | | |
|    Dormitory | n/a | n/a | 16.1% |
|    Off-campus housing alone | n/a | n/a | 0% |
|    Off-campus housing with non-relatives | n/a | n/a | 22.6% |
|    Off-campus housing with family | n/a | n/a | 59.7% |
|    Other | n/a | n/a | 1.6% |
| Exercise on an average weekly basis | 2.179 | 1.624 | n/a |
| *Stress management interventions* | | | |
|    Exercise | n/a | n/a | 23/37.1% |
|    Sleep | n/a | n/a | 25/40.3% |
|    Television | n/a | n/a | 26/41.9% |
|    Friends | n/a | n/a | 23/37.1% |
|    Family | n/a | n/a | 10/16.1% |
|    Music | n/a | n/a | 16/25.8 % |
|    Food | n/a | n/a | 14/22.6% |
|    Other | Draw, clean, shop, cuddle, breathe, laugh, cry, cook, video games, dance, time-manage, computer, dog | | 33/53.2% |

**Appendix J**

**Figure 2. Descriptive Statistics, Measure: SNSI and its Four-Factor Structure**

| Time | SNSI (M, SD) | Academic Load (M, SD) | Clinical Concerns (M, SD) | Personal Problems (M, SD) | Interface Worries (M, SD) |
|---|---|---|---|---|---|
| Sum scores possibilities: | 22-110 | 7-35 | 7-35 | 4-20 | 7-35 |
| Week 0 | (62.18, 14) | (22.53, 4.90) | (16.87, 5.29) | (9.81, 3.16) | (21.29, 5.52) |
| Week 1 | (56.71, 15.65) | (19.50, 5.53) | (15.81, 5.48) | (10.34, 3.65) | (18.81, 5.96) |
| Week 2 | (56.24, 15.67) | (20.03, 5.25) | (15.10, 5.57) | (9.87, 3.58) | (18.85, 5.87) |
| Week 3 | (54.02, 16.87) | (18.82, 5.98) | (14.81, 5.85) | (9.92, 3.74) | (17.90, 6.16) |
| Week 4 | (53.65, 17.69) | (18.35, 6.01) | (14.60,5.90) | (9.98, 4.02) | (17.97, 6.39) |

**Figure 3. Bar Graph of the Means of the Weekly SNSI**



Student Nurse Stress Index
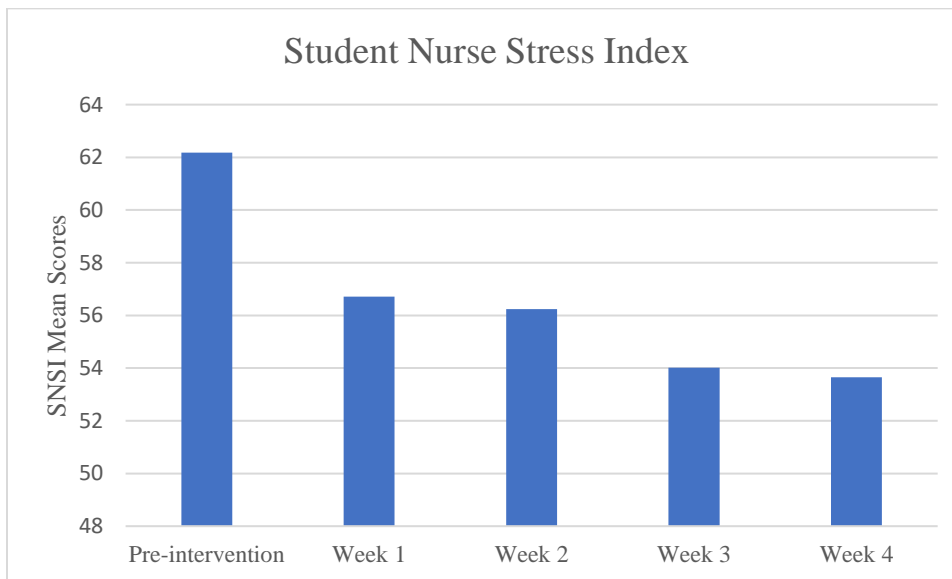
**Figure 4: Bar Graph of the Means of the SNSI's Four Factor Structure**
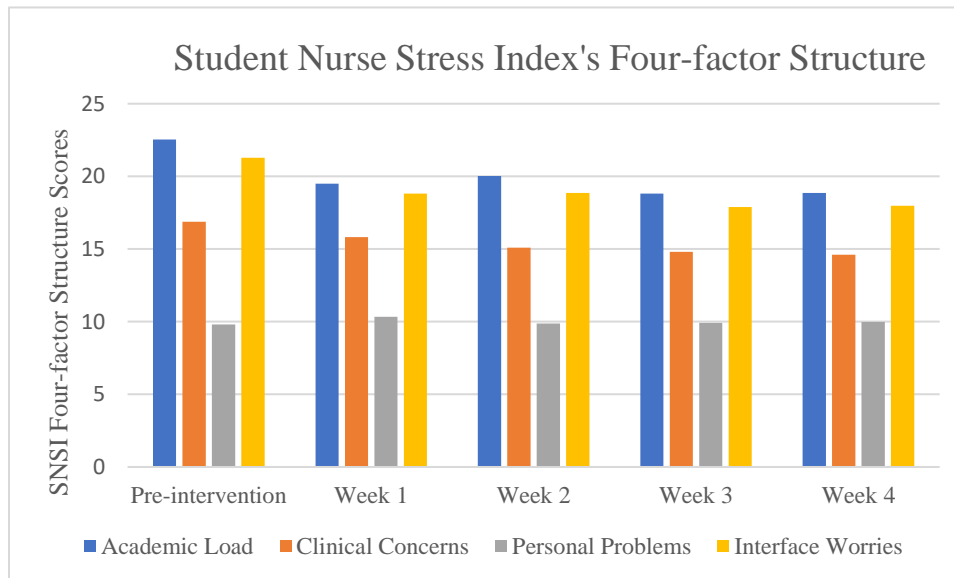


**Figure 5. One-way repeated measures ANOVA, Measure: SNSI, Academic Load, Personal Problems, Interface Worries**

| Source | Type III Sum of Squares | df | Mean square | F | Sig. | Error (time) |
|---|---|---|---|---|---|---|
| Greenhouse-Geisser (SNSI) | 2,892.084 | 2.329 | 1241.913 | 21.598 | .000 | 142.053 |
| Greenhouse-Geisser (Academic Load) | 659.761 | 2.850 | 231.525 | 27.959 | .000 | 172.828 |
| Greenhouse-Geisser (Personal Problems) | 10.806 | 3.294 | 3.281 | 0.868 | .467 | 200.907 |
| Greenhouse-Geisser (Interface Worries) | 469.110 | 2.780 | 168.744 | 18.324 | .000 | 169.581 |

**Figure 6. Friedman with a Post hoc analysis with Wilcoxon signed-rank test (Bonferroni correction applied, resulting in a significance level set at *p* <0.005) Measure: Clinical Concerns**

| N | 62 |
|---|---|
| Chi-Square | 21.966 |
| df | 4 |
| Asymp. Sig. | .000 |

a. Friedman Test

| | Clinical Concerns 1 - Clinical Concerns | Clinical Concerns 2 - Clinical Concerns | Clinical Concerns 3 - Clinical Concerns | Clinical Concerns 4 - Clinical Concerns | Clinical Concerns 2 - Clinical Concerns 1 | Clinical Concerns 3 - Clinical Concerns 1 | Clinical Concerns 4 - Clinical Concerns 1 | Clinical Concerns 3 - Clinical Concerns 2 | Clinical Concerns 4 - Clinical Concerns 2 | Clinical Concerns 4 - Clinical Concerns 3 |
|---|---|---|---|---|---|---|---|---|---|---|
| Z | $-2.302^b$ | $-3.327^b$ | $-3.302^b$ | $-3.762^b$ | $-2.456^b$ | $-2.942^b$ | $-3.322^b$ | $-1.033^b$ | $-1.594^b$ | $-1.016^b$ |
| Asymp. Sig. (2-tailed) | .021 | .001 | .001 | .000 | .014 | .003 | .001 | .302 | .111 | .309 |

a. Wilcoxon Signed Ranks Test
b. Based on positive ranks.

**Figure 7. Pairwise Comparisons, Measures: SNSI, Academic Load, Personal Problems, Interface Worries.**

Measure: SNSI

| (I) time | (J) time | Mean Difference (I-J) | Std. Error | Sig.[b] | 95% Confidence Interval for Difference[b] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | 5.468* | 1.073 | .000 | 2.343 | 8.592 |
| | 3 | 5.935* | 1.254 | .000 | 2.282 | 9.589 |
| | 4 | 8.161* | 1.430 | .000 | 3.996 | 12.327 |
| | 5 | 8.532* | 1.431 | .000 | 4.363 | 12.701 |
| 2 | 1 | -5.468* | 1.073 | .000 | -8.592 | -2.343 |
| | 3 | .468 | .647 | 1.000 | -1.418 | 2.354 |
| | 4 | 2.694 | .949 | .062 | -.072 | 5.459 |
| | 5 | 3.065* | .949 | .020 | .300 | 5.829 |
| 3 | 1 | -5.935* | 1.254 | .000 | -9.589 | -2.282 |
| | 2 | -.468 | .647 | 1.000 | -2.354 | 1.418 |
| | 4 | 2.226 | .804 | .075 | -.116 | 4.568 |
| | 5 | 2.597* | .774 | .014 | .343 | 4.851 |
| 4 | 1 | -8.161* | 1.430 | .000 | -12.327 | -3.996 |
| | 2 | -2.694 | .949 | .062 | -5.459 | .072 |
| | 3 | -2.226 | .804 | .075 | -4.568 | .116 |
| | 5 | .371 | .717 | 1.000 | -1.719 | 2.461 |
| 5 | 1 | -8.532* | 1.431 | .000 | -12.701 | -4.363 |
| | 2 | -3.065* | .949 | .020 | -5.829 | -.300 |
| | 3 | -2.597* | .774 | .014 | -4.851 | -.343 |
| | 4 | -.371 | .717 | 1.000 | -2.461 | 1.719 |

Measure: Academic

| (I) time | (J) time | Mean Difference (I-J) | Std. Error | Sig.[b] | 95% Confidence Interval for Difference[b] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | 3.032* | .468 | .000 | 1.669 | 4.395 |
| | 3 | 2.500* | .426 | .000 | 1.258 | 3.742 |
| | 4 | 3.710* | .562 | .000 | 2.074 | 5.345 |
| | 5 | 4.177* | .566 | .000 | 2.529 | 5.826 |
| 2 | 1 | -3.032* | .468 | .000 | -4.395 | -1.669 |
| | 3 | -.532 | .281 | .633 | -1.352 | .287 |
| | 4 | .677 | .439 | 1.000 | -.602 | 1.957 |
| | 5 | 1.145 | .448 | .131 | -.160 | 2.451 |
| 3 | 1 | -2.500* | .426 | .000 | -3.742 | -1.258 |
| | 2 | .532 | .281 | .633 | -.287 | 1.352 |
| | 4 | 1.210* | .364 | .015 | .150 | 2.269 |
| | 5 | 1.677* | .366 | .000 | .610 | 2.744 |
| 4 | 1 | -3.710* | .562 | .000 | -5.345 | -2.074 |
| | 2 | -.677 | .439 | 1.000 | -1.957 | .602 |
| | 3 | -1.210* | .364 | .015 | -2.269 | -.150 |
| | 5 | .468 | .357 | 1.000 | -.571 | 1.507 |
| 5 | 1 | -4.177* | .566 | .000 | -5.826 | -2.529 |
| | 2 | -1.145 | .448 | .131 | -2.451 | .160 |
| | 3 | -1.677* | .366 | .000 | -2.744 | -.610 |
| | 4 | -.468 | .357 | 1.000 | -1.507 | .571 |

Measure: PersonalProb

| (I) time | (J) time | Mean Difference (I-J) | Std. Error | Sig.[a] | 95% Confidence Interval for Difference[a] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | -.532 | .332 | 1.000 | -1.500 | .435 |
| | 3 | -.065 | .378 | 1.000 | -1.167 | 1.038 |
| | 4 | -.113 | .367 | 1.000 | -1.183 | .957 |
| | 5 | -.177 | .384 | 1.000 | -1.295 | .940 |
| 2 | 1 | .532 | .332 | 1.000 | -.435 | 1.500 |
| | 3 | .468 | .234 | .503 | -.214 | 1.150 |
| | 4 | .419 | .263 | 1.000 | -.346 | 1.185 |
| | 5 | .355 | .315 | 1.000 | -.561 | 1.271 |
| 3 | 1 | .065 | .378 | 1.000 | -1.038 | 1.167 |
| | 2 | -.468 | .234 | .503 | -1.150 | .214 |
| | 4 | -.048 | .275 | 1.000 | -.851 | .754 |
| | 5 | -.113 | .302 | 1.000 | -.992 | .766 |
| 4 | 1 | .113 | .367 | 1.000 | -.957 | 1.183 |
| | 2 | -.419 | .263 | 1.000 | -1.185 | .346 |
| | 3 | .048 | .275 | 1.000 | -.754 | .851 |
| | 5 | -.065 | .281 | 1.000 | -.882 | .753 |
| 5 | 1 | .177 | .384 | 1.000 | -.940 | 1.295 |
| | 2 | -.355 | .315 | 1.000 | -1.271 | .561 |
| | 3 | .113 | .302 | 1.000 | -.766 | .992 |
| | 4 | .065 | .281 | 1.000 | -.753 | .882 |

Measure: Interface

| (I) time | (J) time | Mean Difference (I-J) | Std. Error | Sig.[b] | 95% Confidence Interval for Difference[b] | |
|---|---|---|---|---|---|---|
| | | | | | Lower Bound | Upper Bound |
| 1 | 2 | 2.484* | .454 | .000 | 1.162 | 3.806 |
| | 3 | 2.435* | .504 | .000 | .969 | 3.902 |
| | 4 | 3.387* | .562 | .000 | 1.750 | 5.024 |
| | 5 | 3.323* | .574 | .000 | 1.650 | 4.995 |
| 2 | 1 | -2.484* | .454 | .000 | -3.806 | -1.162 |
| | 3 | -.048 | .296 | 1.000 | -.910 | .813 |
| | 4 | .903 | .469 | .590 | -.464 | 2.271 |
| | 5 | .839 | .477 | .837 | -.551 | 2.228 |
| 3 | 1 | -2.435* | .504 | .000 | -3.902 | -.969 |
| | 2 | .048 | .296 | 1.000 | -.813 | .910 |
| | 4 | .952 | .415 | .255 | -.259 | 2.162 |
| | 5 | .887 | .389 | .261 | -.246 | 2.020 |
| 4 | 1 | -3.387* | .562 | .000 | -5.024 | -1.750 |
| | 2 | -.903 | .469 | .590 | -2.271 | .464 |
| | 3 | -.952 | .415 | .255 | -2.162 | .259 |
| | 5 | -.065 | .316 | 1.000 | -.985 | .856 |
| 5 | 1 | -3.323* | .574 | .000 | -4.995 | -1.650 |
| | 2 | -.839 | .477 | .837 | -2.228 | .551 |
| | 3 | -.887 | .389 | .261 | -2.020 | .246 |
| | 4 | .065 | .316 | 1.000 | -.856 | .985 |

**Figure 8. Mixed ANOVA, Measure: SNSI by Campus**

| Source | Type III Sum of Squares | df | Mean square | F | Sig. | Partial Eta Squared | Error (time) |
|---|---|---|---|---|---|---|---|
| Greenhouse-Geisser | 2759.371 | 2.403 | 11148.424 | 21.141 | .000 | .261 | 144.165 |

**Figure 9: Estimated Marginal Means by time and campus, Measure: SNSI**

Measure: SNSI

| CAMPUS | time | Mean | Std. Error | 95% Confidence Interval | |
|---|---|---|---|---|---|
| | | | | Lower Bound | Upper Bound |
| NB | 1 | 58.724 | 2.550 | 53.623 | 63.826 |
| | 2 | 55.034 | 2.916 | 49.201 | 60.868 |
| | 3 | 55.483 | 2.932 | 49.617 | 61.348 |
| | 4 | 53.138 | 3.155 | 46.827 | 59.449 |
| | 5 | 53.345 | 3.313 | 46.718 | 59.972 |
| NWK | 1 | 65.212 | 2.391 | 60.430 | 69.994 |
| | 2 | 58.182 | 2.734 | 52.713 | 63.651 |
| | 3 | 56.909 | 2.749 | 51.410 | 62.408 |
| | 4 | 54.788 | 2.958 | 48.872 | 60.704 |
| | 5 | 53.909 | 3.106 | 47.697 | 60.122 |

**Figure 10. Plot of estimated marginal means, Measure: SNSI by campus.**
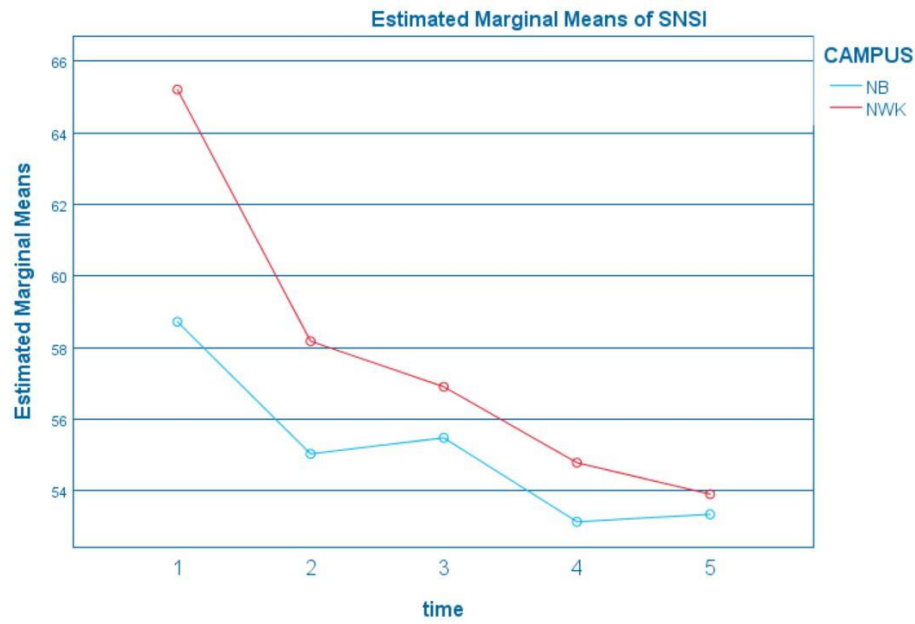
**Appendix K**

**Figure 11. Descriptive Statistics, Measure: Blood Pressure, Heart Rate**

| Time | Systolic Blood Pressure (M, SD) | Diastolic Blood Pressure (M, SD) | Heart Rate (M, SD) |
|---|---|---|---|
| Day 1 | (112.21,9.92) | (70.85, 6.64) | (75.66, 11.721) |
| Day 2 | (111.34,10.117) | (71.84, 6.42) | (74.49, 11.18) |
| Day 3 | (111.84, 10.78) | (71.81, 6.59) | (73.95, 13.17) |
| Day 4 | (111.27, 10.81) | (71.39, 7.24) | (74.98, 12.84) |
| Day 5 | (112.24, 10.23) | (71.65, 6.65) | (75.56, 9.29) |
| Day 6 | (111.76, 12.27) | (72.69, 7.85) | (74.94, 10.84) |
| Day 7 | (111.69, 9.95) | (71.82, 7.54) | (72.94, 9.84) |
| Day 8 | (113.50, 9.41) | (72.21, 6.85) | (74.58, 10.92) |
| Day 9 | (110.69, 10.83) | (70.82, 6.24) | (72.02, 11.68) |
| Day 10 | (112.40, 10.20) | (70.71, 6.75) | (73.79, 10.43) |
| Day 11 | (112.21, 11.18) | (71.40, 5.61) | (73.61, 10.18) |
| Day 12 | (112.02, 9.587) | (71.47, 6.00) | (73.52, 10.82) |

**Figure 12. Plot of Blood Pressure Readings During Days of Exercise**



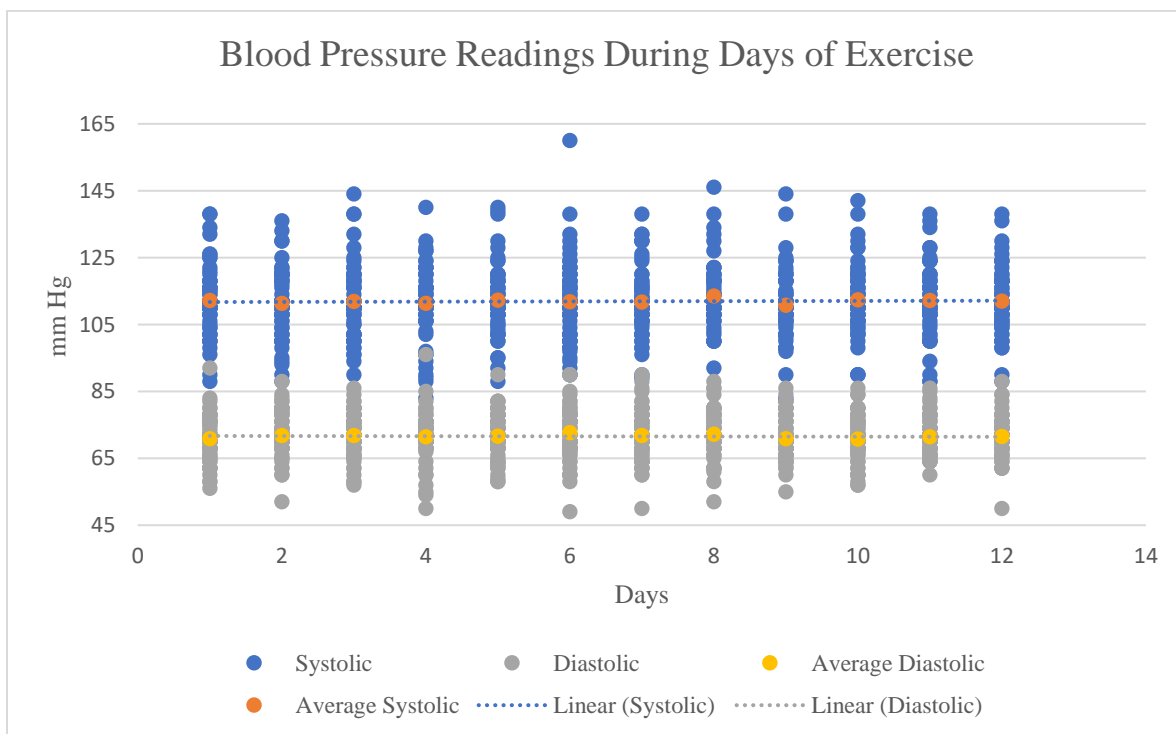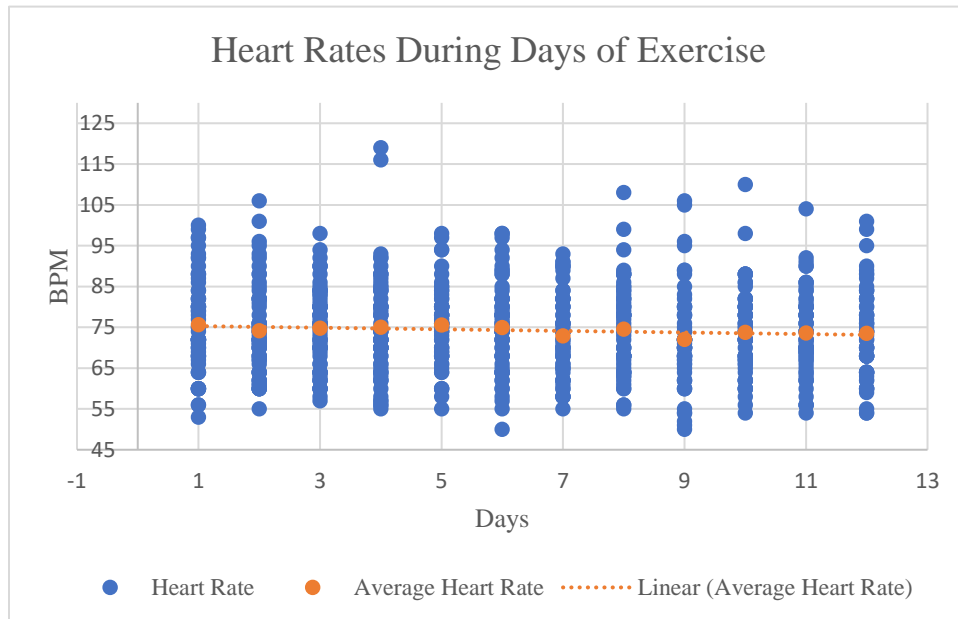Blood Pressure Readings During Days of Exercise

**Figure 13. Plot of Daily Heart Rates during Exercise**



**Figure 14. One-way repeated measures ANOVA, Measure: Blood Pressure, Heart Rate**

| Source | Type III Sum of Squares | df | Mean square | F | Sig. |
|---|---|---|---|---|---|
| Greenhouse-Geisser (Systolic BP) | 331.843 | 8.43 | 39.32 | 1.217 | 0.284 |
| Sphericity Assumed (Diastolic BP) | 232.402 | 11 | 21.127 | .921 | .519 |
| Greenhouse-Geisser (Heart Rate) | 785.645 | 8.005 | 98.145 | 1.825 | .070 |

**Figure 15. Wilcox Signed Ranks Test, Measure: Weight**

**Ranks**

| | | N | Mean Rank | Sum of Ranks |
|---|---|---|---|---|
| WEIGHT POST - WEIGHT PRE | Negative Ranks | 35[a] | 24.03 | 841.00 |
| | Positive Ranks | 10[b] | 19.40 | 194.00 |
| | Ties | 17[c] | | |
| | Total | 62 | | |

a. WEIGHT POST < WEIGHT PRE

b. WEIGHT POST > WEIGHT PRE

c. WEIGHT POST = WEIGHT PRE

**Test Statistics[a]**

| | WEIGHT POST - WEIGHT PRE |
|---|---|
| Z | -3.654[b] |
| Asymp. Sig. (2-tailed) | .000 |

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

## Table of Evidence

| Article # | Author & Date | Evidence Type | Sample, Sample Size, Setting | Study findings that help answer the EBP Question | Limitations | Evidence Level & Quality |
|---|---|---|---|---|---|---|
| 1 | Bergen-Cico 2013 | Quasi-experimental pre- and post-test | 119 undergraduate students (treatment n=72 control 47) enrolled in elective academic courses on addictive behaviors, between January 2010-May 2012 | -increased emotional distress and anxiety that negatively affects academic and social functioning has increased over the past decade<br><br>-less than 20% of college students with anxiety accessed counseling and supportive services--- most handled on their own<br><br>-mindfulness-based programs can reduce emotional distress and foster psychological well-being<br><br>-mbsr yields academic and psychological benefits but in this study, it did not significantly reduce their levels of trait anxiety. | -not randomized control trial<br>-good power, but not specific for nursing students | II<br>A: High |
| 2 | Caldwell 2011 | Quasi-experimental with repeated measures | Public university students 18-48 years old enrolled in a 15-week course of taijiquan (n=76) or special recreation (n=132). | -Taiji classes are associated with increases in mindfulness, well-being, and sleep quality among college students.<br>-Also helped with perceived stress but not self-regulatory self-efficacy | -not randomized<br>-maybe selection bias (those with lower mood enrolled in classes) | II<br>B:Good |
| 3 | Chong 2011 | Systematic review | -Review and appraisal of the effects of yoga on stress management in healthy adults<br>-utilized randomized control trials and clinical control trials in English from 1998-2008 | -what is stress<br>-yoga was beneficial in reducing stress among healthy adults<br>-yoga is effective as other stress reduction techniques such as relaxation, CBT, or African dance. | -small number of studies and associated methodological problems<br>-study design | III<br>B:<br>Good |
| 4 | Colleen 2013 | Prospective quasi-experimental, cohort controlled design | First year college students from 2009-2011 (intervention n= 29, control n=22) | -transition to college<br>-mental health services available<br>-preintervention took place a week before the start of the academic year<br>-post intervention took place at the end of the academic year – 8 months later.<br>-this study was integrated into a course structure—less susceptible to attrition and more portable and generalizable.<br>-pattern of the results may be limited to the degree of which the students engage.<br>-many campuses could benefit from empirically supported generalizable and portable interventions. | -sample size had sufficient power but only to medium to large effects | II<br>A: High |

| | | | | -course-based interventions show particular promise for meeting the needs of broad range of college students---helpful for those who face reservations or challenges in seeking mental health services. | | |
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| 5 | Kotter 2016 | Prospective longitudinal observational study | Medical school students self-rated general and mental health status before and after the freshmen year.<br><br>(they also gathered socio-demographic variables, leisure activity, personality, study related behaviors and experience | -study objections were to investigate how the health of medical students develops over the freshman year and whether certain protective factors can predict general and mental health status after 1 year of medical education<br><br>-93% medical students rated their general health and 88% rated their mental health as good. Then it declined over the first year to 76% and 84%. For general health—regular physical activity was the strongest predictor.<br><br>-Self-rated general and mental health declined throughout the first year of medical education. Physical activity proved to be a strong predictor for the maintenance of good general health. This finding may represent a starting point for health-promoting interventions, such as the provision of time slots for physical activity. | -overrepresentation of women (selection bias) | III B: Good |
| 6 | Kulavic 2013 | Comparison of two groups via survey/questionnaire. Quantitative nonexperimental? | 746 college students (628 TS, and 118 NTS)<br><br>Fall 2010 students volunteered to complete a demographic questionnaire, barriers to being active quiz and exercise motivations inventory-2 | -traditional students are motivated by challenge, social recognition, affiliation, competition, appearance, and nimbleness<br>-nontraditional were more motivated by health pressure and ill health avoidance<br>-teaching about health concerns can help motivate these students- specifically non traditional.<br>-the results also suggest that teaching time management skills may be an effective tool in helping to overcome the top 3 barriers of lack of time, lack of energy, and lack of will power in the college student population. | -self reported -which could affect the results if the student did not understand a question or if a false information was reported.<br>-confounding variables such as reemployment status and income may affect results | III B: Good |
| 7 | LaChausse 2012 | Longitudinal experimental design<br><br>Quasiexperimental? | Students completed baseline and follow-up surveys regarding their nutrition and physical activity behaviors, self-efficacy, stress, attitudes and body weight. | -compared with the on-campus course and comparison group, the MSB Nutrition program increased fruit and vegetable consumption, reduced stress, and increased fruit and vegetable consumption, reduced stress and increased fruit and vegetable self-efficacy, but NO significant effect on student's exercise self-efficacy, exercise behavior or weight loss. | -self reporting<br>-self-selection<br>-unsure if the program will be sustainable past college | II B:Good |
| 8 | Li 2012 | Systematic review | PubMed 1974-2010. | -yoga can be supplement to pharmacologic therapy and may improve stress and anxiety symptoms. | -data is inconsistent | III C:low |

| | | | | -yoga can be encouraged to improve quality of life and maybe the symptoms of stress and anxiety. | | |
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| 9 | Lo 2017 | Pre and post scores on lifestyle perceptions with intervention. No control group Quasi-experimental | Students of the bachelor of Physiotherapy program at Monash University between 2009-2013 in their first year. N=236 | -stress among university students in cross-sectional survey 1,168 students attending the health services at 3 large Australian university approach half of the students reports psychological distress (Stallman & Schochet, 2009) | - wellness was implemented into their program as opposed to specifically exercise | II A:High |
| 10 | Mosca ritolo 2009 | Position statement | No sample size | -student nurse anxiety in a clinical learning environment -stress and anxiety -Neuman systems Model - overview of the use of humor, peer instructors and mentors, and mindfulness training to decrease stress and anxiety in undergraduate nursing students. | -Position statement so design did not provide any generalizable data | IV B: Good |
| 11 | Rajag opal 2012 | Pre-experimental approach with one group pre and post test and no control Quasi-experimental | First year Bsc nursing students | -medication is effective in improving wellbeing status, reducing anxiety, and improving study habits among the nursing students. -relevance to clinical practice | -Self-construction of the tool on self-reported health status and religion practices -No control | II B:Good |
| 12 | Roll 2012 | Pre and post-test comparison group design Quasi-experimental | -201 undergrad health profession students from nursing, occupational health and speech language pathology | -incorporating content on healthy behaviors in undergraduate curricula may better prepare professionals for living a healthy lifestyle -to retain nurses one approach is to teach effective stress management and healthy behaviors before they join the workforce | -limited generalizability to other groups because it was a homogenous convenience sample of students. | II B: Good |
| 13 | Scarap icchia s 2015 | Cross sectional analysis Analysis of the national college health assessment II survey and measures specific to the MoveU campaign. Non-experimenntal descriptive cross sectional design | Students from a Canadian university March 2013 (n=2,784) | -benefits of physical activity -national guideline initiative for exercise -MoveU | -design prevents assessment of the direction of relationships and formal tests of mediation. -self reported | III B: Good |
| 14 | Smith 2011 | Quasi-experimental | 81 undergraduate students in the southeastern U.S. Three groups – integrated yoa, | -yoga practiced in a more integrated form with an ethical and spiritual component may provide more additional benefits over yoga practiced as an exercise regimen | -Not randomized study design -exercise was specific to yoga | II B: Good |

| | | | | yoga-as-exercise, and control group. | -suggests that a comparison group that practices an alternative form of exercise can show whether its physical activity or yoga itself. | | |
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| 15 | Tauko bong 2014 | Systematic review | | PubMed, Science Direct, CINAHL, Amed and Pedro were used to search—29 articles | -there is unequivocal evidence that physical activity can be used to improve health in many conditions and promotion of physical activity produces more health benefits than formal exercise plans (WHO, 2011) <br> -PT students should learn health promotion on physical activity to teach their patients | -some evidence only available in abstract form | III B: Good |
| 16 | Yan 2015 | Qualitative | | 33 college students participated in 5 audio recorded focus groups. | -physical activity decreases significantly from high school to college <br> -American college health association 49.6% of college students did not meet the minimum requirement for healthy exercise. <br> -this increases their risk for major comorbidities <br> Existing evidence examine the relationship between physical activity and mental health suggest that it is association with better short term mental health outcomes—elevated mood and sensitivity and reduce stress, anxiety and depression. | -small study with mostly white women. <br> -self-selected | III C: low |
| 17 | Bryer 2013 | Cross-sectional descriptive design | | Students enrolled in an associate degree nursing program n=143 | -compared with students in courses of study other than nursing, nursing students usually spend more time in class, in the laboratory, and in the clinical setting, and they have more emotional demands. <br> -coping mechanisms used to control these stressors are alcohol consumption, smoking, and irregular eating patterns. <br> -Pender's health promotion model <br> - health promotion was measured using the barriers to health promoting activities instrument <br> -revised health promoting lifestyle profile II was used to measure the health behaviors of nursing students. <br> -traditional nursing students were more likely to participate in general health-promoting behavior than nontraditional students, and they had higher scores on the interpersonal relations, spiritual growth, physical activity, nutrition, and stress management. <br> -recommendations→ health promoting behaviors is a key factor to success, both during the course and after graduation. | -not generalizable <br> -good recommendations but not specific to implementing exercise as a stress reduction interventon | III B: Good |
| 18 | Chow 2008 | Exploratory descriptive quantitative study | | Questionnaire was designed for students to report variety of self-care topics including sleep, exercise, diet, fluid intake, weight, checkups, | -Orem's self-care <br> -physically active nursing students are more capable of providing dietary counseling than sedentary students. <br> -lack of physical exercise in nursing students may be a barrier to patient education about exercise | -great questionnaire but evaluated self-care techniques from nursing students not specific to how exercise influences their overall health | III B:Good |

| | | | | relaxation, complementary therapy use, alcohol intake, health goals and smoking. | | | |
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| 19 | Clark 2011 | Personal statement | --- | -a disturbing trend in college student health is the lack of self-care and increase in student stress. -in the past 20 years, suicidal ideation has tripled among undergraduate college students and the likelihood of college student suffering depression has doubled. -in nursing school several studies have demonstrated that nursing students have high levels of stress and could benefit from learning to manage stress during their academic journey. | -personal statement study design | IV B:Good |
| 20 | Feitosa 2011 | Descriptive quantitative study | 58 undergraduate students – open,closed and mixed questions. To evaluate the stress level→ Perceived Stress Scale-PSS 14. | -stress definition - causes of stress are diverse and depend on the existing risk factors in the environment such as transport, emotional status, family status, location of study, work, eating habits, lack of leisure and sports, among others. -high level of stress in undergraduate nursing students | -identified how stress in high in undergradates but not specific to exercise | III B: Good |
| 21 | Jacob 2013 | Cross sectional design | Undergraduate PT, CD and NS students enrolled in 2009-2010 in Israel Anonymous questionnaires used for data collection for all students at least 1 mo before exam period. | -the major stress among the students was from academic work load. -second source of stress is financial and then third personal | -evaluated stress amongst medical undergraduate students but not specific for nurses. | III B: Good |
| 22 | Michael 2017 | Experimental design – stratified random sampling | 80 nursing students | -Stress decreased with yoga for nursing students -stress is used every where -stress among college students→ academic stress | Yoga was only practiced over a period of one week which may not have been sufficient. | II B: Good |
| 23 | Plaiti 2016 | Observational pilot study | 145 freshmen students during exam period of the winter semester of 2013 in the Nursing Department | -course grades were not affected by state and total anxiety but only by trait anxiety levels. -findings suggest that students achieved lower course grades when trait anxiety was present. | -unsure with students were already diagnosed types of anxiety disorders | III B:Good |
| 24 | Priesack 2015 | Cross-sectional survey | 108 undergrad preregistered nurse students. | -physical health and psychological health is related to self-efficacy. -emphasis should be placed on how successful negation of stressful events can contribute to development of self-efficacy and psychological well-being. | - lack of generalizability | III B: Good |
| 25 | Yucha | Quasi-experimental two group posttest design | Nursing students assigned to a home hospital clinical placement | -Student nurse stress index -college students experience greater stress than did students in the past | -differences weren't large enough to be clinical | II B: Good |

| | | | or a control clinical placement Fall 2005-fall 2006 | -assigning students to a home hospital improved anxiety but nit academic performance. | | |
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| 26 | Hartley 2011 | Hierarchal or sequential regression analysis | N=605 undergraduate students from 2007-200 | -evidence that intrapersonal resilience factors can contribute to understanding of how undergraduate students negotiate an increasingly stressful college environment. | -study used convenience sampling →two types of errors | III B: Good |
| 27 | Adams 2016 | Cross-sectional data | 157 undergraduate students Dec 2013-Mar 2014 | -perceived stress is an important mechanism to separately explain the relationship between financial strain and psychological symptoms and between financial strain and academic and social integration | -causal relationship cannot be determined d/t study design | III B: Good |
| 28 | Conley 2011 | Self-reported stress and ambulatory blood pressure measurements | 2006-2008 academic school year 99 undergraduate students European American participants mostly | -what stress does to the body -cadiovascular responses -test anxiety -temporary elevations in SBP during acute academic stress | -influences of stress but not how exercise or academic load are related | III B:Good |
| 29 | George 2008 | Qualitative non experimental? | 231 students in central Alberta, Canada complete a 5-day time diary and a 71-item questionnaire assessing the influence of personal, cognitive, and attitudinal factors on success | -positive associations exist between academic success and participation in physically active leisure, planned exercise program, a healthy diet, and health-related practices such as eating breakfast | -qualitative study design did not allow for intervention testing | III B:good |
| 30 | Jacob 2017 | Cross-sectional study design | Three undergraduate PT class in 1 academic year 1 week prior to finals. | -suggests that freshmen experience greater difficulty to cope with academic demands for the first time. | -Not RCT -focused on academic demands not exercise | III B: Good |