BACCALAUREATE STUDENT NURSES KNOWLEDGE, SELF-EFFICACY, BELIEFS AND PRACTICES IN ENGAGING IN PHYSICAL ACTIVITY COUNSELING

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BACCALAUREATE STUDENT NURSES KNOWLEDGE, SELF-EFFICACY, BELIEFS AND PRACTICES IN ENGAGING IN PHYSICAL ACTIVITY COUNSELING

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Physical activity, is an integral health promoting behavior that patients should receive counseling on to improve or maintain their health. Counseling in the clinical setting is a strategy recommended to increase physical activity. Student nurses who receive appropriate education and practice related to physical activity counseling can potentially impact the effort to promote physical activity. **Purpose:** The purpose of this study was to explore undergraduate baccalaureate nursing student's knowledge, self-efficacy, beliefs and practices for engaging in physical activity counseling. **Methods**: Baccalaureate undergraduate nursing students (N = 539) were surveyed to examine 1) knowledge of the current physical activity guidelines, 2) self-efficacy in counseling patients on physical activity, and 3) beliefs and practices related to physical activity. Additionally, the influence of the student's academic status, type of program in which they are enrolled and their personal engagement in physical activity was explored to determine the effect on factors one through 3. **Results:**48% of the students would recommend an amount of physical activity that is consistent with the current physical activity guidelines. Self-efficacy for physical activity counseling was moderate-to-strong despite reporting limited opportunities to engage in physical activity counseling. Students (97%) reported that physical activity counseling was a role of the nurse. Physical activity counseling was ranked 4th among 9 other lifestyle behaviors requiring counseling but was not a priority when ranked amongst 9 other nursing care responsibilities (ranked 9th). The academic status of the student did influence

the student knowledge of the guidelines, their self-efficacy, beliefs and practices. The program in which the student was enrolled influenced self-efficacy, with second degree program reporting more self-efficacy for physical activity counseling than traditional nursing program. The nursing student's personal physical activity engagement did influence their self-efficacy and prioritization given to physical activity counseling; however, the pattern of these findings was inconsistent. **Conclusion:** Modifications to nursing curricula may be required to enable the nursing student to gain better knowledge, skills and experiences related to counseling patients on physical activity. This would be important for effective physical activity counseling within health care settings.

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PREFACE

I would like to express my gratitude to my committee members for their expertise and guidance throughout the completion of this dissertation. Dr. John Jakicic, my advisor, for his expertise in health and physical activity, his inestimable research experience, and support throughout this project. Dr. Leslie Hoffman, thank you for your genuine commitment and your invaluable direction given to me throughout this entire project. Dr. Rosemary Hoffmann, my mentor, thank you for your guidance, advice, words of encouragement, and understanding of the process which was so helpful in my completion of this dissertation. Dr. Bethany Barone Gibbs, thank you for your statistical analysis support and helpful insight of statistical methods. I am grateful for all your efforts on my behalf, and it has been a privilege to have all of you on my committee. I would also like to thank Dr. Thomas Zullo for his statistical analysis support.

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1.0 INTRODUCTION

Chronic disease, the leading cause of death and disability in the United States, is a medical or health problem that is most often not curable, and results in symptoms or disabilities that require long-term management. Estimates indicate that as many as 133 million Americans live with chronic disease, and millions of new cases are diagnosed each year (1). Chronic diseases such as obesity, diabetes, stroke, cancer, arthritis and cardiovascular disease account for 7 of the 10 leading causes of death in the United States (1, 2).The cost of caring for chronic illnesses consume 75% of the nation's two trillion dollar medical care costs(3). In addition, chronic illness often results in depression, decreased quality of life, loss of ability to perform activities of daily living, and accounts for one trillion dollars a year lost in productivity (4).

Chronic diseases are often referred to as "lifestyle diseases" because they result from individual lifestyle behavior choices. Specifically, four lifestyle factors have been identified as being responsible for the onset of chronic disease: insufficient physical activity, alcohol use, poor nutritional habits and tobacco use (1).Healthy People 2020 is a science-based plan of objectives for improving the health of all Americans by the year 2020. Within this plan, physical activity is identified as an important indicator of health and an activity that can benefit virtually all individuals (5, 6).

Nevertheless, estimates indicate that 1 in 10 Americans will die prematurely of disorders related to physical inactivity (7). Currently in America, less than half (48%) of all adults meet

the current Physical Activity Guidelines (8). This is concerning because physical activity can reduce the risk of developing many chronic diseases such as Type 2 diabetes, heart disease, stroke and many forms of cancer (9-15). Also, findings from many large observational studies suggest that exercise can reduce all-cause mortality in both men and women (16-19). For example, in a retrospective study in which physical activity habits were analyzed in 10,269 Harvard alumni, men who engaged in moderately vigorous sports activity had a 23% lower risk of death than those who were less active (20). The Framingham Heart Study found that moderate to high physical exercise, compared to low physical exercise, increased life expectancy for men by 1.3 and 3.7 years, respectively; results were similar for women (1.5 and 3.5 years) (21).

Physical activity has the potential to protect against these chronic conditions by improving glucose uptake and insulin sensitivity, improving lipid profiles, lowering blood pressure, decreasing risk of obesity, maintaining blood vessel health, and maintaining muscle mass (9, 11-15). Therefore, it is recommended that people engage in regular physical activity to reduce the risk of developing these conditions, or reduce disability once they occur (13).

The 2008 Physical Activity Guidelines for Americans, which are the first comprehensive national guidelines for physical activity, recommend that adults engage in a minimum of 150 minutes per week of moderate-intensity aerobic activity, or 75 minutes per week of vigorous-intensity aerobic physical activity, and a minimum of 2 days a week resistance exercises (5).However, estimates indicate that less than 50% of adults in the United States meet these recommended levels (8). Thus, there is a need to implement more effective intervention strategies to promote engagement in physical activity.

1.1 PROMOTION OF PHYSICAL ACTIVITY BY HEALTHCARE PROVIDERS

Given the health benefits of physical activity, healthcare providers should encourage patients to engage in sufficient physical activity to realize these health advantages. Physicians are in a key position to influence patients to improve their health through proactive counseling on increasing their physical activity. However, studies evaluating the outcomes of physician counseling have been conflicting, with results ranging from no improvement to modest improvement in physical activity (22). Furthermore, the number of physicians who provide counseling is low, with about only 1/3 of patients reporting that their physician advised them to be physically active (23). Both Lawlor et al.(24) and Douglass et al.(25) found that 96% and 92.2% of physicians, respectively, felt that providing counseling on physical activity was important. However, they also identified barriers to providing such counseling. The top three barriers to physical activity counseling identified by physicians were lack of time, lack of knowledge or training in counseling patients on physical activity, and lack of prior success in changing patient behaviors(26). Moreover, a survey conducted in 2003 found that if physicians were to provide counseling on preventive services such as engaging in physical activity, it would require an average of 4.4 hours per day. Unfortunately, this time requirement is unlikely to be economically feasible, or allow sufficient time for physicians to treat other acute and more time-sensitive medical conditions (27).

An alternative to physicians providing counseling on physical activity may be to utilize nurses to provide direct counseling to patients. Nurses are the largest group within the professional health care occupations, and a major role of the nurse is to educate the patient on ways to restore or prevent illness, and to promote health. Nurses, as part of the healthcare team, are seen as a credible source of health care advice by patients, and could play a pivotal role in educating people on ways to maintain health and avoid complications (28). In addition, *The*

American Nurses Association Health Systems Reform Agenda states "nurses can save money by focusing their efforts on wellness and prevention of complications and adverse events" (29).

From an implementation perspective, nurses may be able to overcome many of the barriers physicians face in providing counseling on physical activity. For example, nurses have more time available to counsel patients on physical activity, and may be better prepared. In the outpatient setting, the median time for an office visit is 15.7 minutes covering 6 topics (30). Physician counseling regarding physical activity during an office visit averages 1minute and 30 seconds compared to the nurse who averages 4 minutes and 26 seconds(31). Bedside nurses were reported to spend 6 minutes per day per patient counseling on physical activity (32).

Baccalaureate trained nurses may have more education in counseling patients on physical activity than physicians. In a 2011 cross-sectional survey (33) of 129 U.S. medical schools, only 13% of medical schools provided instruction on the health benefits of physical activity, whereas 72% of baccalaureate nursing schools incorporated objectives from Healthy People 2020, including physical activity, into their curriculum (34). Moreover, in a study of attitudes related to physical activity counseling, 50% of nurses felt that they could offer the patient a great deal more in the way of lifestyle counseling, compared to 17.3% of general practitioners (35).

Despite the potential for nurses to effectively counsel patients on physical activity, nurses also report barriers to physical activity counseling that are similar to what has been reported by physicians. For example, studies show that nurses do not provide health promotion education because they lack time, knowledge about the physical activity guidelines and also the risk reduction, as well as confidence in the application of that knowledge to patient education (36-38). Zewe noted that 40% of acute care nurses indicated that a significant barrier to engagement of patients in physical activity education related to insufficient knowledge, and that 25% of the

nurses felt they did not know how to counsel a patient on physical activity (32). While education on health-related lifestyle factors is seen as a role of the nurse, the aforementioned findings suggest that nurses may not be prepared to counsel or teach patients concerning physical activity. Yet, it has been suggested that nurses can have a positive impact on changing lifestyle behaviors (39, 40).

If nurses are to provide counseling on physical activity, it is essential that they receive sufficient education on the physical activity guidelines to enable them to effectively counsel a patient. It is important to evaluate whether baccalaureate nursing programs provide sufficient training in regard to the health benefits of physical activity and how to counsel patients. In a study conducted in 1992 that examined the most important health promotion practices as perceived by student nurses, engaging in aerobic activity was not identified as one of the top 10 most important health promotion practices (41).

Despite an extensive literature review, no additional studies were identified that surveyed beliefs of baccalaureate student nurses regarding physical activity counseling. Therefore, it remains unclear if knowledge and attitudes of nursing students related to physical activity have changed over the past 20 years. An evidence-based assessment is important to evaluate whether the next generation of nurses can be effective agents for behavior change with regard to physical activity. Such knowledge would identify current beliefs on the part of students and, if lacking, identify areas for curriculum modification within baccalaureate level nursing training programs.

1.2 SPECIFIC AIMS

The overall purpose of this study was to determine the knowledge, self-efficacy, practices and beliefs of baccalaureate nursing students about patient education related to physical activity.

The specific aims of the study were to determine the:

1. Knowledge of students enrolled in a baccalaureate level nurse training degree program of the current physical activity public health guidelines.
2. Self-efficacy of students enrolled in baccalaureate nurse training degree programs to educate patients on physical activity.
3. Importance that students enrolled in baccalaureate level nurse training degree programs place on providing physical activity counseling compared to other lifestyle health-related behaviors (smoking, diet, alcohol ingestion, etc.).
4. Importance that students enrolled in baccalaureate level nurse training degree programs place on providing physical activity counseling compared to other patient care responsibilities (performing assessments, passing medications, performing patient education, performing treatments, etc.).
5. Perception of students enrolled in baccalaureate level nurse training degree programs as to whether they should provide physical activity counseling after licensure as a registered nurse (RN).
6. Influence of the year of academic training in a nursing degree program (freshman, sophomore, junior, senior) on factors examined in Specific Aims 1-5.
7. Influence of type of training program (traditional or second degree accelerated) on factors examined in Specific Aims 1-5.

8. Influence of personal engagement in physical activity by the nursing student on factors examined in Specific Aims 1-5.

2.0 LITERATURE REVIEW

2.1 CHRONIC DISEASE

Chronic disease presents a heavy burden to society today in terms of medical costs and human suffering. Currently, in the United States, 133 million people live with chronic disease, and millions of new cases are diagnosed each year. In fact, nearly 1 out of every 2 adults live with a chronic condition (3). Chronic diseases such as heart disease, cancer, stroke, diabetes, and obesity are the leading causes of premature mortality in the United States. Also, it is estimated that about one-fourth of those with chronic conditions experience significant limitations in activities of daily living (3). Greater than 75% of health care costs are attributed to the care of chronic disease (3). Chronic disease is more common among the older adult population, but can affect people of all ages. Fortunately, many of the aforementioned chronic diseases can be prevented, or disability delayed by increasing one's physical activity.

2.2 PHYSICAL ACTIVITY GUIDELINES

Being physically active is one of the most important steps that individuals can perform to maintain or improve their health. Physical activity refers to body movement produced by the contraction of skeletal muscle that results in a substantial increase over resting energy expenditure (42). In 2008, the American Federal Government listed the first-ever set of science-based physical activity guidelines for Americans. The guidelines describe the amount and types of physical activity which offer substantial health benefits for Americans. The recommendations for adults to maintain or improve their health are: moderate intensity (3-6 METS) aerobic physical activity for a minimum of 30 minutes on at least 5 days a week or vigorous intensity (7-10 METS) aerobic physical activity of a minimum of 20 minutes on 3 days of each week, and resistance exercises a minimum of 2 days each week (5). Given that there is a dose response relationship between physical activity and health, physical exercise performed above and beyond the guidelines may result in higher levels of physical fitness, greater reductions in risk for chronic disease, and prevention of unhealthy weight gain. By adhering to these physical activity guidelines, Americans can reduce the risk of early death, coronary heart disease, hypertension, Type II diabetes, breast and colon cancer, falls, undesired weight gain and depression (43). The recommendations for physical activity for the adult to achieve each of the above health-related benefits are listed below (5):

1. To reduce the risk of all-cause mortality, it is recommended that adults should engage in 120-150 minutes per week of moderate-to-vigorous-intensity leisure time physical activity.
2. To reduce the risk of cardiovascular disease, the recommendation for adults is to engage in 120-150 minutes of moderate-intensity physical activity.

3. Recommendations for adults in relation to energy balance are specific as to whether the goal is to achieve weight maintenance, weight loss, or weight maintenance following weight loss.

   a. For weight maintenance, the recommended dose is 150 minutes of moderate-intensity physical activity per week, or to engage in 75 minutes of vigorous-intensity physical activity per week.

   b. For weight loss of 5%, the recommended dose is low-intensity physical activity for 70 minutes per day, moderate-intensity physical activity for 45 minutes per day, or vigorous-intensity physical activity for 22 minutes per day.

   c. For weight maintenance following weight loss, the recommendation is> 300 minutes per week of moderate-intensity physical activity.

4. Recommendations for specific health conditions are as follows:

   a. For individuals with arthritis to improve pain management, function and quality of life, the recommendation is 130-150 minutes per week of moderate-intensity, low impact physical activity.

   b. To reduce fall risk in the older adult, the recommendations include balance and strengthening physical activities for 30 minutes per session 3 times per week, and moderate-intensity walking for 60 minutes per week.

   c. To reduce the risk of breast cancer and colon cancer, moderate-to-vigorous-intensity physical activity of 30-60 minutes per day is recommended.

   d. To improve metabolic health, 120-150 minutes per week of moderate-to-vigorous-intensity physical activity is recommended.

e. To decrease the risk for depression, the recommendation for adults is for moderate-intensity physical activity 30-60 minutes per day on 3-5 days of the week.

2.3 CARDIOVASCULAR DISEASE

Cardiovascular disease (CVD) and stroke are the 1st and 3rd leading causes of death in the United States, respectively (44). In 2010, the cost to the nation was more than $444 billion in health care expenses and lost productivity (44). CVD, including hypertension, coronary artery disease, stroke and congestive heart failure are known as common consequences of lifestyle choices made concerning diet, physical activity, smoking, alcohol intake and weight gain. Weight reduction, improved dyslipidemia, increased physical activity, and blood pressure control are generally accepted lifestyle measures to aid in the management of CVD. When examining physical activity specifically, and its relationship to CVD, studies report an inverse relationship between physical activity and CVD morbidity and mortality (45, 46). In these studies, low fitness levels are associated with high levels of morbidity and mortality (45, 46).

Blair (45) conducted a prospective study that enrolled 6,819 healthy and 2,958 unhealthy men, and found that men who were initially unfit and became fit had lower death rates than those men who remained unfit. Death rates for those who increased their fitness ranged from 33% lower for those who remained fit in the 40 to 49 year age group to more than 70% lower than those who remained unfit in the 20-39 year and 50-59 year age group (45). Men aged 60 years and older who improved their fitness had death rates 50% lower than the persistently unfit men (45). Men in all age groups who were fit and maintained fitness experienced the lowest death rate.

The Harvard Alumni Study (46) found that the size of the risk reduction in relation to CVD and mortality associated with physical activity was equivalent to that associated with other favorable risk reductions such as smoking cessation, avoiding obesity and hypertension. For instance, those who stopped smoking reduced their risk for coronary heart disease mortality by 44% compared to men who continued to smoke, and men who started a moderately vigorous exercise program reduced their risk by 41% compared to men who remained sedentary (46). Thus, regularly performed exercise increases cardiovascular functional capacity, and decreases myocardial oxygen demand at any level of physical activity in both healthy individuals, as well as most with cardiovascular disease.

In a prospective study on women, Manson et al. (12) examined the association between the score for total physical activity, walking and vigorous exercise, and the incidence of coronary events among 72,488 nurses enrolled in the Nurse's Health Study. Total physical activity scores of the women were found to have a strong inverse relationship to the development of coronary heart disease (CHD) events. The relative risk decreased with increasing quintiles for MET scores compared to the lowest quintile group (relative risk 0.77, 0.65, 0.54, and 0.46 $p < 0.001$) (12). Women who remained sedentary had considerably higher rates of coronary events compared to those who became active. Comparing the relative risk for coronary events among sedentary women to those women who increased their activity, as reported in increasing quintile groups for total physical activity, were 0.85, 0.79, 0.67, and 0.71 (p for trend =0.03) (12). Both brisk walking and vigorous exercise were associated with similar substantial reductions in the incidence of CHD events among women of 30 to 40 percent (12).

In the primary prevention of CHD, the independent role of physical activity is well founded, and has been assessed in many reviews and meta-analyses (47- 50). A review

concluded that physical activity is associated with a 20% to 30% lower risk of CVD (48, 50). From these reviews, it is possible to identify quantitative assessments of the amount of physical activity required to lower risks instead of qualitative levels of physical activity, e.g. high versus low (Physical Activity Committee Advisory Report, 2008). In a meta-analysis, Sattelmair et al. (51) pooled the results from prospective epidemiological studies published between 1995 and 2009 to quantify the dose response relationship between physical activity and the risk for CHD, including both the amount of physical activity required and the magnitude of benefit to CHD risk. Included were studies investigating various types and extent of physical activity, e.g., leisure time physical activity (LTPA), time spent walking, walking pace, occupational physical activity, transport physical activity, non-leisure physical activity and total physical activity. A total of 33 prospective cohort studies were analyzed. Individuals who engaged in 150 minutes per week of moderately intense leisure time physical activity had a 14 % lower risk of CHD (RR 0.86) compared to those reporting no LTPA. Those who engaged in 300 minutes per week of moderate-intensity LTPA had a 20 % lower CHD risk (RR 0.80) (51).The risk reduction for CHD among men were only modestly lower (28%) with higher levels of physical activity (five times the recommended basic guideline). For women, no added lower risks were observed at higher levels of LTPA until five times the basic guideline, which was 48% lower risk. Lower risk rates were also observed among those that were physically active, but below the recommended level set in the 2008 Guidelines. The latter finding provided support for the assertion that even some amount of physical exercise is better than none.

In addition, the association of physical activity and CHD risk was stronger in women than in men for the majority of physical activity types. Among all the studies that assessed

LTPA, those conducted in men showed a 22% lower risk comparing most with the least active, and those conducted in women showed a 33% lower risk for CHD (51).

Strokes are the leading cause of disability in the United States. There is limited therapy for the treatment of strokes, and rehabilitation and chronic care is lengthy and costly. Therefore, preventative treatment is imperative. Physical inactivity increases the risk for stroke in both men and women. Booth et al. (7) identified 22 studies which reported that regular physical activity reduced the risk of ischemic stroke in men and women. Hu et al. (11), using data from the Nurses' Health Study, followed 72,488 women who were stroke-free at baseline for over 8 years to determine the incidence of stroke with differing quintiles of physical activity measured in METS in hours per week. Findings from multivariate analysis while controlling for age, BMI, history of hypertension and other covariates, indicated that increasing physical activity was strongly inversely associated with risk of total stroke (11). The relative risk ratios (RRs) in the lowest to highest quintiles were 1.0. 0.98, 0.82 and 0.74 and 0.66 (p for trend = .005) (11). Thus, these findings support the assertion that physical activity, even if moderate in intensity, can reduce stroke risk for women.

Lee (52) performed a systematic review of studies conducted between 1966 to 2002 in order to test the relationship between physical activity and the incidence of stroke. While many studies were supportive of a benefit, there were conflicting findings. Some studies reported an inverse relationship, a "U-shaped" relationship or no relationship at all. The study included studies that enrolled individuals of both genders who engaged in a variety of physical activity, leisure time activity or cardiopulmonary fitness classified as low, moderate or high. When cohort and case control studies were combined, the highly active individuals compared to the low active individuals had a 27 % lower risk of stroke incidence or mortality ($p<0.001$) (52). Individually,

cohort and case control studies had different percentages of the risk reduction. For cohort studies, the highly active persons had a 25% lower risk of stroke incidence or mortality (RR 0.75 CL, 0.69 to 0.82) compared with low-active individuals (52). For case control studies, highly active individuals had a 64% lower risk of stroke incidence compared to their low active counterparts (52). Additionally, moderately and highly active persons had a lower risk for ischemic and hemorrhagic strokes than those who were low-active.

Sattelmair et al. (53) studied subjects from the Women's Health Study over the course of 11.9 years, and reported that the association between risk of total stroke and time spent in leisure time activity did not show a significant risk reduction, but did evidence a trend toward borderline significance (p=.06). Ischemic stroke evidenced a similar trend, but hemorrhagic strokes showed no trend. There was no overall linear trend of decreased risk for total stroke across categories of different vigorous leisure time activity. However, Sattelmair at al. did find that there was an inverse dose response relation for the risk of total stroke when comparisons were made using time spent walking and usual walking pace (*p* for trend = 0.002 and 0.007, respectively) (53). Women who walked for ≥ 2 hours per week had a 30% lower risk for stroke (RR=0.7), and women who walked at a brisk pace > 4.8km/hr. had a reduced risk of 37% compared to women who did not walk at all (RR=0.63) (53). Borderline significance for the inverse dose response trend was found for ischemic stroke (p trend =0.07) for both time and pace of walking compared with women who did not walk at all. For hemorrhagic stroke, the inverse dose response relationship was significant for both time spent walking and pace (p trend=0.002 and 0.04, respectively) (49). A 57% lower risk for hemorrhagic stroke was found for those who walked ≥ 2 hours per week (RR = 0.43), and for those women who walked at a pace of > 4.8 km/hour had a 68% lower risk (RR = 0.31) compared to those women who did not walk at all (53).

Wendel-Vos and colleagues conducted a meta-analysis that included studies of physical activity and stroke published through 2001, and reported differences in types of physical activity (occupational versus leisure time) and its effect on stroke risk. Moderate intensity physical activity compared with inactivity showed a protective effect on total stroke for both occupational (RR = 0.64, 95% CI: 0.48–0.87) and leisure time physical activity (RR = 0.85, 95% CI: 0.78–0.93) (54). Also, high levels of occupational activity were more protective against ischemic stroke (RR = 0.77, 95% CI: 0.60–0.98) compared to moderate and inactive occupational physical activity (RR = 0.57, 95% CI: 0.43–0.77)(54). For leisure time physical activity, high levels were found to be more effective for protection against total stroke (RR = 0.78, 95% CI: 0.71–0.85), ischemic stroke (RR = 0.79, 95% CI : 0.69-0.91), and hemorrhagic stroke (RR = 0.74 95% CI: 0,57 – 0.96) when compared to low levels of leisure time physical activity or inactivity (RR = 0.78, 95% CI: 0.71–0.85) (54).

2.4 HYPERTENSION

Hypertension is defined as a systolic blood pressure ≥ 140mm Hg, and a diastolic blood pressure ≥ 90 mm Hg. Known as a leading cause of CVD, hypertension affects approximately 30% of the population (6). As one ages, there is an alarming increase in the prevalence of hypertension; over half of individuals 60–69 years of age are diagnosed with hypertension (55). Death from both ischemic heart disease and stroke increase progressively and linearly as blood pressure increases from a systolic blood pressure of 115 mm Hg and diastolic blood pressure of 75 mm Hg to higher levels (56). This relationship between CVD risk and hypertension is continuous, consistent, and independent of any other risk factor (55). A doubling of mortality from both

ischemic heart disease and stroke is seen for every 20 mm Hg increase in systolic blood pressure or a 10mm Hg increase in diastolic blood pressure (55). The Framingham Study, which was one of the first studies to identify physical inactivity as a risk factor, reported that blood pressure values in the range of 130 to 139 / 85-90 mm Hg were associated with a two-fold increase in relative risk from CVD compared to those who were normotensive (55). Epidemiological studies have indicated there is an inverse relationship between habitual physical exercise and blood pressure level (57, 58). Hypertension controlled with anti-hypertensive treatments can reduce the excess CVD mortality risk observed among the hypertensive population (RR = 1.15, p= 0.53) (55).

Aerobic and resistance training have both been shown to reduce blood pressure in normotensive and hypertensive subjects. One of the earliest reviews on exercise training and blood pressure reported that 8 of 12 studies found modest reductions in systolic blood pressure of 9 mm Hg and 7 mm Hg in diastolic blood pressure at rest (59). More recently, Cornelissen and colleagues conducted studies on the effects of aerobic and resistance exercise to determine the influence on blood pressure in adults. Normotensive subjects who underwent aerobic training reduced their blood pressure by 3.0 mm Hg (95% CI: 2.-4.0) /2.4 mm Hg (95% CI: 1.7-3.1) (60) and those who underwent resistance training decreased their blood pressure by 3.9 mm Hg (95% CI: 1.5 – 6.2) / 3.6 mm Hg (95% CI: 2.1-5.0) (61).

In hypertensive patients, few studies have been done on resistance training, with the majority focusing on aerobic training. In these studies, aerobic training reduced blood pressure by an average of 6.9/4.9 mm Hg (62). Overall, the reduction in blood pressure with aerobic training was more pronounced in hypertensive subjects who benefited from an average blood

pressure reduction of 7/6 mm Hg, compared to normotensive subjects who averaged a reduction in blood pressure of 3/2 mm Hg (62).

Similarly, leisure time physical activity has been shown to be associated with reduced blood pressure. Reaven et al. (63) performed a cross-sectional study of women 50 to 89 years of age, investigating the effects of LTPA on blood pressure and the rate of hypertension. Overall reduction in the prevalence rates of hypertension, including systolic and diastolic blood pressure, were significantly lower ($p<0.05$) in active women at all physical activity intensities compared with sedentary women (63). Systolic pressure reductions ranged from 7 mm Hg for those who performed light LTPA to 13 mm Hg in those who performed heavy LTPA ($p< .05$) (63). Prevalence of diastolic hypertension decreased nearly stepwise with each higher physical activity classification ($p =.005$ for linear trend) (63). Further supporting evidence was reported in a study (64) that enrolled older men and women who underwent exercise training. Findings indicated that systolic and diastolic blood pressure was markedly lower, even with low-intensity physical activity (64). Together, these studies suggest that physical activity, light to modest, can be an effective way to lower one's blood pressure.

For those that undergo cardiac rehabilitation, exercise therapy as a central element had positive effects on CVD mortality and CVD risk factors including blood pressure (65-66). In a review of 48 trials, cardiac rehabilitation was associated with a significant reduction in all-cause mortality (odds ratio [OR] = 0.80; 95% CI: 0.68 to 0.93) (65). In these studies, systolic blood pressure was reduced significantly with cardiac rehabilitation (weighted mean difference, -3.2 mm Hg; 95% CI: -5.4 to -0.9 mm Hg), however, there was no difference in diastolic blood pressure (-1.2 mm Hg; 95% CI: -2.7 to 0.3 mm Hg) (65). Even though there is stronger evidence for aerobic exercise effects on lowering the blood pressure, some effects can be seen with

resistance training (68). An additional meta-analysis on controlled trials performed from 1966 to 1998 by Kelley and Kelley found that a reduction in systolic BP ranged from -2 to -3 mm Hg and -2 to -4 mm Hg (68). These findings are supported by Fagard's conclusions. While these changes are relatively small, resistance training can help reduce the risk for CVD.

2.5 ATHEROSCLEROSIS

Atherosclerosis, a progressive chronic disorder, occurs when fat, cholesterol and other substances build-up in the walls of arteries and form structures called plaque. Over time, this plaque can block arteries and cause damage to multiple organs throughout the body. As the plaque grows, arteries become narrower, making it harder for blood to flow to the tissues. Pieces of the plaque may break off and travel to other areas, thereby blocking smaller vessels, reducing oxygen supply to the tissue, thus damaging or causing death to the tissue. Often, atherosclerosis first presents itself as a CVD event such as a myocardial infarction or stroke. Atherosclerosis is a leading cause of morbidity and mortality in the industrial world. For many individuals, atherosclerosis is a result of an unhealthy lifestyle and, in particular, eating a diet high in fat and cholesterol, being overweight and sedentary. Exercise is thought to increase flow-mediated stress on the arterial wall by increasing the release of nitric oxide (NO). Nitric oxide protects the endothelial lining of vessels by acting as a vasodilator, an inhibitor of atherogenesis, and thrombosis inhibitor.

Blood lipid levels are known to play a significant role in the development of atherosclerosis. The 27th Bethesda Conference of the American College of Cardiology categorized LDL-cholesterol as Category I (proven), HDL-cholesterol as Category II (likely to),

and Category III (might) in regard to ability to reduce risk for CVD (69). LDL plays a pivotal role in the development of atherosclerosis because it is a principal carrier of cholesterol in the blood, and is associated with increased CHD risk when levels exceed>180mg/dl. HDL is thought to be independently and inversely related to severity of atherosclerosis and risk of CHD (70). The National Cholesterol Education Program (NCEP) classifies abnormal blood lipid levels as follows: a total cholesterol (TC) >240 mg/dl, low density lipoprotein cholesterol (LDL) > 130mg/dl, triglycerides (TG) >200 mg/dl and high density lipoprotein cholesterol (HDL) ≤35mg/dl (71).

Regular physical activity has been shown to have a favorable effect on one's blood lipids. Monda et al. (72) conducted a 12-year longitudinal study designed to investigate the effects of physical activity on plasma lipid profiles by race and gender. The study enrolled African American and Caucasian men and women aged 45-65 from the Atherosclerosis Risk in Communities Study (ARIC). The estimated effect of an increase of a 180 MET– minute/week in sports or exercise was associated with increased HDL across all 4 race-sex groups (72). The increase in HDL ranged from 2.96 – 4.85 mg/dl and was statistically significant at $p< 0.05$ (72). A decrease in triglycerides was noted only in Caucasian male and females -12.93 and -8.95, respectively ($p< 0.05$) (72). Additionally, a decrease in low density lipoproteins (LDL) was found only in women, and a decrease in total cholesterol was associated with the African American race and female gender (72). Several longitudinal studies previously evidenced similar significant findings related to HDL and triglycerides in response to change in physical activity (73-75). Increased levels of HDL were positively associated with increased physical activity in the Coronary Artery Risk Development in Young Adults Study (CARDIA), Stanford Five City Project, and the Amsterdam Growth and Health Study (73-75). Conversely, in the Young Finns

Study, no association between activity change and HDL was found, but an inverse association between physical activity and triglyceride levels was found (76). In a review of 51 studies, of which 28 were randomized controlled trials, and the training intensity was moderate to vigorous, the change most often observed was a positive change in HDL-C ($p<.05$) (77). Increased HDL-C with physical activity change was inversely associated with its baseline level ($r= -0.462$) (77). In addition, increases in HDL of 2.53 and 1.95 were found respectively in two meta-analysis studies which evaluated the evidence on the effects of physical activity on lipids (78 -79).

However, evidence for a beneficial response from physical activity on LDL is not consistent. Monda et al. suggested that there is a gender difference in response to increased physical activity and the lowering of LDL (72). Conversely, the Heritage Family Study did not find a gender difference in response to physical activity and the lowering of the LDL (80).

In terms of the dose required to lower one's lipid profile, Kodama et al. performed a meta-analysis to estimate the minimum amount of exercise that would be required to increase HDL-C levels, and the characteristics of the exercise required to produce this change. Findings indicated that a minimal weekly time of 120 minutes, expending 900 kcal of energy would result in a modest, but significant, change in HDL-C of 2.53 mg/dl ($p<0.001$) (79). Furthermore, every 10 minute prolongation of exercise per session was associated with an approximate 1.4mg/dl increase in HDL-C. There was no significant association between exercise frequency and intensity. Vigorous exercise was not necessary as long as energy expenditure by exercise was sufficient (79). However, when controlling for the length of the exercise duration, it was found that the length of the exercise session was positively associated with a change in HDL. Pooled MDHC (mean differences of HDL) was not significant for 30 minutes or less per session (0.27 mg/dl; 95% CI: -2.04 to 2.59 mg/dl), suggesting that an increase in time of the session, rather

than doing multiple sessions per week, may be required to produce a significant change in HDL-C (79). Further research would be required to confirm the preferred duration of exercise needed to modify HDL-C.

Overall, evidence supports that increasing physical activity leads to modest changes in HDL-C. For each 1mg/dl in HDL, there is an associated significant reduction in CVD of 2% in males and 3% in females (81). Physical activity in conjunction with other therapies can be part of an effective treatment plan to improve one's lipid profile.

2.6 DIABETES

Approximately 26 million Americans have either Type 1 or Type 2 diabetes, and an additional 79 million adults have pre-diabetes (82). Diabetes is the sixth leading cause of chronic disease in America, and a risk factor for cardiovascular disease and renal failure (82). Roughly 90% of diabetes cases are Type 2—the type associated with an increase in body weight (83). Type 2 diabetes has become a rapidly increasing problem for developed countries due to an abundance of energy dense food and a sedentary lifestyle. Both are key contributing factors to the substantial increase in cases. It has been well documented that physical activity can improve glycemic control, blood glucose levels, and insulin sensitivity. Hence, increasing physical activity is critical to reducing the incidence of Type 2 diabetes.

A substantial number of studies support the importance of physical inactivity as a risk factor for Type 2 diabetes (83-86, 89) From a large scale observational study that enrolled male alumni students at the University of Pennsylvania, Helmrich et al. reported there was a 6% lower risk for Type 2 diabetes for each 500 kcal/ week of self-reported LTPA (84). Similarly, a study

performed by Manson et al. that enrolled male physicians found that there was an inverse relationship between the incidence of Type 2 diabetes and frequency of vigorous-intensity physical activity (85). These important findings indicated that there was a 42% risk reduction for Type 2 diabetes for those who exercised with vigorous-intensity 5 times/week as compared to those who exercised with vigorous-intensity less than once per week (85).

Although observational studies suggest a causal relationship between physical activity and Type 2 diabetes, they do not provide definitive evidence that higher levels of physical activity can delay the progression of Type 2 diabetes. Several randomized controlled trials subsequently reported evidence that an intensive lifestyle intervention, which included physical activity, could delay Type 2 diabetes in high-risk individuals with impaired glycemic control (86-89).

Knowler and colleagues (86) conducted a randomized clinical trial among those who were at high-risk of developing Type 2 diabetes to determine if a lifestyle intervention or treatment with metformin could prevent or delay the onset of Type 2 diabetes. The study was conducted across 27 centers, and included randomization of participants into one of three interventions: standard lifestyle recommendations plus administration of metformin, standard lifestyle recommendations plus administration of a placebo, or an intensive program of lifestyle modification. The lifestyle modification program consisted of diet modification, a minimum of 150 minutes of physical activity per week and weight reduction. The incidence of Type 2 diabetes was reduced by 58% in the lifestyle intervention group, and 31% in the metformin group compared to the control group (86). This study shows evidence that increased physical activity can be an effective treatment in combination with other lifestyle interventions to aid in the delay of Type 2 diabetes.

Physical activity which results in higher levels of fitness can also provide health benefits to those who already have Type 2 diabetes. Wei and colleagues (91) evaluated the association of low cardio respiratory fitness and physical inactivity with mortality in 1,263 men diagnosed with Type 2 diabetes. The study was conducted over a 12-year period. Findings indicated that men in the low-fitness group's relative risk for all-cause mortality was 2.1 (95% CI, 1.5 to 2.9) compared with fit men who had an adjusted risk of 1.7-fold (95% CI, 1.2-fold to 2.3-fold) higher than that in men who reported being physically active (91).

Similarly for women, in the Nurses' Health Study (90), the association between increased physical activity and risk for CVD was examined among 5,129 female nurses with Type 2 diabetes. Findings indicated an inverse relationship between levels of physical activity and coronary heart disease and stroke. Among women who did not exercise vigorously, the multivariate relative risks for cardiovascular disease across quartiles of MET score for walking were 1.0, 0.85, 0.63, and 0.56 ($P = 0.03$ for trend) (90). A faster than usual walking pace was independently associated with lower risk.

Gregg and colleagues looked specifically at the association between walking and the risk for all-cause mortality and CVD mortality among 2,896 persons with diabetes. Compared with inactive individuals, those who walked at least 2 hours per week had a 39% lower all-cause mortality rate and a 34% lower CVD mortality rate (92).

In addition, physical activity has been associated with reductions in glycosylated hemoglobin. In a meta-analysis performed to analyze effects of structured physical activity versus advice only for reductions in glycosylated hemoglobin that evaluated subjects who performed aerobic, resistance or a combination of resistance and aerobic exercise, reductions in glycosylated hemoglobin were greater in the structured physical activity group (0.67%)

compared to the advice only group (0.43%) (93). With activity of >150 minutes per week, subjects achieved even greater reductions in glycosylated hemoglobin (0.89%) (93). Overall, these studies confirm the important benefits of physical activity which should be incorporated into the plan of care for those with Type 2 diabetes.

Physical activity has also been shown to have a protective effect against resistance to insulin. In Type 2 diabetes, both β-cell function and insulin resistance are present. The disposition index (DI) denotes the relationship between the secretion of insulin and resistance to insulin uptake by the cell. In Type 2 diabetes, the DI level decreases with the onset of Type 2 diabetes, inferring increasing insulin resistance and β cell dysfunction. The effects of physical exercise on the DI were examined in the Studies of a Targeted Risk Reduction Intervention through Defined Exercise Study (STRRIDE). Changes for the moderate-intense physical activity group were significant ($p < 0.035$) (94). Both the low and vigorous activity group evidenced borderline significance ($p = 0.063$) (94). Another study examining the reduction in the development of insulin resistance in older women indicated that insulin sensitivity did not decline in those who engaged in regular physical activity, but did decline in the physically inactive group. However, only the group with the high intensity activity showed significant improvement (p=.0.02) (95).

Overall, these studies support the health benefits which regular physical activity can have on prevention and management of Type 2 diabetes. The Physical Activity Guidelines for Americans with diabetes are as follows: to engage in 150 minutes of moderate physical activity per week, or 75 minutes of vigorous physical activity per week once given verification from their physician (42). Nevertheless, diabetics have been reported to be 34% less likely to engage in physical activity at the recommended levels ($p<0.001$) (96). Increasing education on physical

activity to those with pre-diabetes or Type 2 diabetes therefore should be an important part of the education provided by healthcare professionals.

2.7 OBESITY

Obesity has become a significant and increasing health care problem for the American people. In the United States, access to and consumption of foods that are calorie dense, nutrient poor, and high in sugars and fats, in combination with decreased energy expenditure due to advanced technology, has led to a progressive increase in the numbers of individuals whose body mass index (BMI) indicates obesity. The lifetime risk for being overweight or obese within the United States is approximately 50% and 25%, respectively (97). In 2010, the prevalence of those who were obese was 35.5% among adult men and 35.8% among adult women, with no significant change compared with 2003-2008 (98). While the prevalence of individuals who are overweight and those with mild obesity has begun to stabilize, the prevalence for severe obesity rose by 52% in five years (99). Concerns regarding obesity relate to its identification as a risk factor for early mortality, coronary heart disease, hypertension, dyslipidemia, stroke, Type 2 diabetes, many forms of cancer, sleep apnea, arthritis, liver and gallbladder disease, and gynecological problems such as infertility and irregular menses.

Exercise has been shown to have a beneficial effect on body weight of those who are overweight or obese. From a 2009 literature review on exercise for obesity, Shaw et al. (100) found that exercise alone produced marginal change (5 kg or less) when it was the sole treatment for weight reduction compared to no treatment at all (100). Similarly, the Advisory Committee for the 2008 Physical Activities Guidelines for Americans reported that physical activity

performed for a minimum of 150 minutes per week at a moderate-to-vigorous intensity would reduce body weight by 1% to 3% (101). This finding was similar to that of the American College of Sports Medicine who concluded that physical activity performed fewer than 150 minutes per week had minimal influence on weight reduction, whereas physical activity of 150 minutes or more per week resulted in weight loss of 2 to 3 kg (102). A greater reduction in weight (5-7.5 kg) occurred when physical activity was performed from 225 minutes to 420 minutes per week (102). The review supports the assertion that physical activity, performed without restriction of food intake, will have a modest benefit that increases as the dose of physical activity increases (102). These findings were further supported in a study of overweight adults whose BMI average was 25.0 kg/m^2 to < 30 kg/m^2. Jakicic and colleagues found that participants who lost 3% of their body weight or more over a period of 18 months increased their baseline activity by 162 minutes per week, whereas those who were found to be within 3% of their initial body weight or gaining more than 3% of their body weight increased their physical activity above baseline levels of 78.2 and 74.7 minutes, respectively (103). The actual weight loss for those who lost more than 3% of their body weight was 5.4 ± 2.6 kg which corresponds to a weight loss of 7.4% ± 3.6% of initial body weight (103).

Being both overweight and obese has been associated with an increased risk of death (100). A longitudinal study that enrolled 116,564 women—30 to 55 years of age and free of known CVD and cancer—were followed over a 24-year period to determine the association of the BMI, physical activity and death, found that mortality rates increased with higher BMI values among women who had never smoked (P for trend < 0.001) (104). As physical activity increased within all levels of adiposity, there appeared to be a beneficial effect in decreased risk for mortality, but the higher risk of death associated with obesity was not eliminated compared to

those that were lean (i.e. those that had a BMI of lower than 25 kg/m^2 and physically active (3.5 hours or more per week) (104). The relative risk of death was 1.55 (95% CI: 1.42 to 1.70) for lean and inactive women, 1.91 (95 % CI: 1.60 to 2.30) for women who were obese (BMI> 30kg/m^2) but active, and 2.42 (5% CI: 2.14 to 2.73) for inactive obese women (104). It was estimated that inactivity (< 3.5 hours/week) together with excess body weight (BMI >25 kg/m^2) could account for 31% of all premature deaths among non-smoking women (104). The Pennington Center Longitudinal Study also examined the effects of obesity and lifestyle factors on the development of chronic disease and premature mortality. An increase in abdominal visceral adipose tissue (VAT) was significantly associated with mortality, after adjustments for age, sex, and year of examination with Hazard ratio (HR) of 1.46 (95% CI: 1.05 to 2.05) (105). When including the abdominal subcutaneous adipose tissue, the association was even higher (HR 1.74) (95% CI 1.17- 2.59) (105). The HR was 1.62 if the sample was limited to those who were free of stroke, heart disease and cancer at baseline (105). Both studies support the fact that excess weight increases the risk of earlier mortality. However, physical activity does provide some decrease in risk, even for those who are obese but are also active.

Obesity is a significant risk factor for the development of CVD including hypertension, coronary heart disease, dyslipidemia and heart failure. Higher mortality rates have been directly associated with higher BMI levels in both men and women. Hu and associates found that excess weight (BMI >25kg/m^2) and physical inactivity together could account for 59 % of the deaths from CVD among non-smoking women in their longitudinal study (104). Obese men and women have twice the prevalence of hypertension compared to those with BMI values less than 25 kg/m^2 (104). Several factors that contribute to increasing stress on the cardiovascular system in the obese population include hypertension, increased vascular resistance, sodium

retention, increased blood volume and cardiac output demand. This stress can cause eventual left heart hypertrophy and heart failure. In addition, those who are obese, particularly those with central abdominal obesity, often have lipid profile abnormalities which promote the development of atherosclerosis, e.g., increased low density lipoprotein, very low density lipoprotein, cholesterol and triglyceride levels, as well as decreased levels of high density lipoproteins.

Currently, evidence suggests that adipose tissue is an organ that secretes increased levels of inflammatory markers in obese individuals. Cytokines released from adipose tissue stimulate the liver to produce excess C-reactive protein (CRP) and fibrinogen, now noted as a risk factor for coronary heart disease in overweight and obese individuals. The chronic inflammation noted in obese individuals is thought to contribute to the development of atherosclerosis (106). TNFα, also an inflammatory marker, is overproduced in adipose tissue and contributes to increased insulin resistance. In a study conducted to determine if diet induced weight loss or exercise effects chronic inflammatory markers in older obese adults, no significant effect was demonstrated from exercise, but the diet-induced weight loss intervention showed a significant reduction of CRP ($p=0.01$), interlukin6 ($p= 0.009$) and TNFα ($p= 0.007$) (107).

Both physical inactivity and obesity are risk factors for the development of Type 2 diabetes. Not all obese individuals have Type 2 diabetes, but 80% of those with Type 2 diabetes are obese (108). Both weight gain and central abdominal adiposity are positively correlated with the risk of developing Type 2 diabetes (109). However, obesity was found to be an even stronger independent risk factor than physical activity in the development of Type 2 diabetes in a systemic review (110). In the five studies reviewed, the relative risk for the development of Type 2 diabetes with the individual effect of obesity ranged from 4.10 to 17.5 (4.10, 5.62, 10.74, 8.75, 17.5) while the relative risk with the individual effect of physical activity ranged from 1.12

to 2.18 (2.18,1.12, 2.08, 2.00, 1.25) (110). This effect may be related to the increase of TNFα from adipose tissue, leading to increased insulin resistance which then leads to an increase in free fatty acids in the adipose tissue, leading to even more insulin resistance and the development of Type 2 diabetes.

In a recent study examining baseline activity patterns of obese Type 2 diabetics, those enrolled in the Look Ahead Study were examined using an objective measure of accelerometry. Participants were categorized based on their BMI measurement: 25 to < 27 kg/m^2, 27 to < 30 kg/m^2, 30 to <35 kg/m^2, 35 to <40 kg/m^2, and ≥ 40 kg/m^2. There was a significant difference in the bouts of physical activity achieving ≥ 3 METS and lasting longer than 10 minutes. For participants who met this criteria, the duration per bout was lower at higher BMI categories at 20.74 minutes and 17.02 minutes, respectively ($p < 0.0001$) (107). Total Mets minute per bout showed a similar pattern of 113.9 for the lowest BMI category to total METS minute per bout 86.4 METS for the highest BMI category ($p<0.0001$) (111). Also, bouts per day evidenced the same pattern of higher bouts of activity per day of 0.79 in the lowest BMI category to the least bouts of activity per day in the greatest BMI category of 0.52 ($p < 0.0146$) (111). Overall, as BMI increased, exercise capacity decreased. The effect of excess body weight on exercise capacity has implications for prescribing physical activity when beginning a weight reduction program; therefore, the exercise prescription should take into account the level of excess weight.

In summary, obesity is a risk factor for the onset of chronic disease. Obesity is an increasing problem that substantially increases risk factors for many of the most prevalent chronic diseases in America. It is imperative that weight loss be achieved in those individuals who are overweight or obese in order to achieve a healthier life. Physical activity should be part of the interventions offered to achieve weight loss. Higher levels of physical activity, beyond

what is recommended by the Activity Guidelines for Americans to maintain weight, are required to achieve weight loss. For a 5% weight loss, the recommended dose is 70 minutes per day of low-intensity physical activity, 45 minutes per day of moderate-intensity physical activity, or 22 minutes per day of vigorous-intensity physical activity (5). Once weight loss is achieved, ≥ 300 minutes per week of moderate-intensity physical activity is required to maintain weight loss (5).

2.8 CANCER

Cancer is the second leading cause of death in America, exceeded by only heart disease, and accounts for 1 out of every 4 deaths (112). It is estimated that one-quarter to one-third of the new cancer cases expected to occur in the U.S. in 2013 will be related to being overweight, obese, physical inactiveness, and poor nutrition choices. Thus, all aforementioned factors could potentially be prevented, or at least minimized by maintaining a healthy weight (112). Physical inactivity has been identified as a risk factor for cancer of the colon and breast (10). Cancer of the colon or rectum is the second leading cause of cancer-related deaths in the United States (113). Lack of physical activity has consistently been shown to be associated with rectal cancer. The risk for colon cancer may be reduced by as much as 50% among men and women who actively perform high levels of physical activity (114). Maintaining high levels of physical activity appears to provide the greatest protection. In the Harvard Alumni Study, men who were at least moderately active at two assessments were 48% less likely to develop colon cancer than men who were inactive at both assessments (115). Among men who were sedentary at the initial assessment, those who increased their physical activity during the 11 to 15 year follow-up period were 13% less likely to develop colon cancer, compared to those who remained sedentary during

that same time period (115). In the Nurses Health Study and the Health Professionals Follow-up Study, both women and men lowered their risk of colon cancer by engaging in moderate-intensity physical activity such as brisk walking or stair climbing (116, 117).

There have been a number of mechanisms proposed for the relationship between colon cancer and physical activity. It is believed that increased physical activity may decrease gastrointestinal transit time and thus exposure of the gastrointestinal tract to potential carcinogens in food (114). Insulin—a growth factor for colonic epithelial cells—is thought to promote tumor growth, and physical activity is thought to aid in decreasing circulating levels of insulin (116, 118). Other possible mechanisms include the potential that physical activity alters prostaglandins levels which are a part of the inflammatory pathway, improves immune function, and potentially alters bile acid metabolism (117). Finally, Kirsten-Ras (Ki-Ras) gene mutations have been reported in 30-50 % of colon tumors (119). Men, but not women, with low levels of physical activity were more likely to have a tumor with the Ki-Ras mutation (119).

Breast cancer is the second leading cause of cancer-related deaths, and the most diagnosed cancer in women in the United States (113). Physical inactivity is a risk factor in the development of breast cancer. Several studies support that physical activity has a protective effect on breast cancer risk in both post-menopausal and pre-menopausal women (120-122). In a review of the epidemiological literature on physical activity and breast cancer risk reduction, 76% of the studies evidenced an average risk reduction of 25-30% (123). In addition, a dose response effect was similar in both moderate and vigorous physical activity of 22% and 26%, respectively (123). Peel and colleagues looked specifically at cardio respiratory fitness (CRF) in women and risk reduction for breast cancer mortality, and found an inverse relationship between CRF and the risk of breast cancer mortality (124). Women with an exercise capacity of < 8

METS had close to a three-fold risk of dying of breast cancer compared to those who had MET levels > 8(124). This study suggests that at the intensity of activity of >8 METS may be required to obtain substantial protective benefits (124).

2.9 PHYSICAL ACTIVITY COUNSELING OF STUDENT NURSES

Knowing that physical inactivity—a modifiable risk factor—is a strong determinant of chronic disease, it is imperative that healthcare providers be actively involved in educating patients in order to increase their physical activity level. Physical activity counseling is a strategy suggested for promoting physical activity among the American population. The potential for medical professionals to impact physical activity behaviors amongst their patients has led to multiple recommendations for physical activity promotion to be included into routine clinical practice (6,125,126). Yet, physician counseling to patients concerning increasing their physical activity has evidenced a mix of results which range from no improvement to modest improvement in physical activity (22). Still, the United States Preventative Services Task Force (USPSTF) recommended counseling to promote regular physical activity be provided for all children and adults, based on the evidence of the health benefits of increased activity (126).

Consistent counseling on physical activity by physicians to their patients may occur in as few as 40% of patients, based on a systematic review (127). The studies reviewed included data from mail-in questionnaires and direct observational studies. Of particular interest, the direct observational studies reported the lowest rate of physical activity counseling (127). Lack of time, lack of reimbursement, lack of knowledge about physical activity, and lack of training in the area

of behavioral counseling were cited by physicians as barriers to physical activity counseling (128).

The nursing profession is well recognized for the role of disease prevention and health promotion. Nurses are an integral part of outpatient and inpatient healthcare settings, and thus may be able to provide the counseling on physical activity to patients. Educating patients and families on disease management or prevention has traditionally been a role of the nurse. *The Future of Nursing Report,* published by the Institute of Medicine (IOM), envisions a shift in health care delivery from sick care to well care (129). The IOM sees nursing as intentionally involved in promoting wellness and disease prevention.

As noted previously, physicians may provide physical activity counseling to as few as 40% of their patients (127). Nurses, particularly nurse practitioners, are assuming an increasing proportion of the chronic disease management and preventive health advice. Part of this advice should include physical activity counseling to adults in order to obtain health benefits such as improved quality of life, and prevention or delay of the progression of many chronic diseases.

Buchholtz and Purath (130) performed a descriptive exploratory study examining factors related to physical activity counseling practices of a random national sample of adult nurse practitioners (ANP). Inclusion in the study required that participants be full-time or part-time certified ANP practicing in primary care. A web-based questionnaire about physical activity and fitness was accessed by those who agreed to participate. Almost all of the respondents (95%) stated that they provided physical activity counseling to their patients at least once per year, and 74% recommended that their clients accumulate 30 minutes of moderate-intensity physical activity on most days of the week (130). The most common strategies for counseling were discussing physical activity with patients (95%), and giving them written materials (54%) (130).

The majority of the ANP (61%) reported that physical activity assessment and counseling was not part of their formal education. This finding was also noted in another study by Grimstvedt et al. in which (50%) of nurse practitioners reported not receiving physical activity assessment and counseling as part of their formal education (131). ANPs, who reported receiving physical activity counseling in their formal education, evidenced a higher level of knowledge and confidence in assessing and providing counseling on physical activity ($p<.05$) (130). In the Grimstvedt study, the majority (76%) of respondents indicated a desire to have increased training in physical activity counseling (131).

A systematic review was performed by Sargent on lifestyle interventions, performed by nurses to obese adults, with the aim of reducing their risk factors for chronic disease (132). The effectiveness of lifestyle interventions delivered by nurses, given appropriate training, did not differ from the outcomes when compared to the delivery of lifestyle interventions by a dietician, psychologist, or social worker who had previous experience in counseling (132). However, nurses reported barriers when providing physical activity counseling. Specifically, they perceived patients to be uninterested in increasing their physical activity levels, and unlikely to change their behavior. They also stated that they lacked confidence in their counseling skills, and knowledge related to current physical activity guidelines (132).

A study conducted in a large acute care hospital that was designed to assess what acute nurses knew about current guidelines for physical activity guidelines, and the frequency they provided physical activity counseling, reported that 40% of acute care nurses indicated that a significant barrier to engagement of a patient in physical activity education was insufficient knowledge (32). In addition, 37% of the nurses stated they did not know how to counsel a patient on physical activity (32). While teaching may be considered part of the nurse’s role, the limited

number of studies which have investigated nursing practice in this area suggests that nurses may not have received adequate education on this topic. Lack of engagement in health promotion activities is often attributed to lack of confidence, knowledge, experience and training (133, 134).

For nurses to provide counseling on physical activity they must receive education on the current physical activity guidelines, the benefits of physical activity, and how to counsel a patient on physical activity. The undergraduate curricula for nursing students should include training on lifestyle modification, practical advice on diet, physical activity and smoking cessation. Nursing students must understand the importance and impact that increasing one's physical activity can have in the prevention of chronic disease and disability.

The Essentials, developed by the American Association of Colleges of Nursing, outlines the necessary curriculum content, and expected competencies of graduates from baccalaureate nursing schools (135). These guidelines are meant to provide the framework for positioning baccalaureate nursing programs to meet the current and future health care challenges. Essential VII Health Promotion and Prevention, which pertains to population focused nursing, involves identifying determinants of health, and promoting primary prevention and behaviors which allow an individual to make appropriate decisions to maximize their health (135). The University of Pittsburgh School of Nursing—the site of this study—uses *The Essentials* to guide the development of the curriculum for the undergraduate student. Content on health promotion is incorporated into the nursing courses from the freshman to senior year with an opportunity to practice health promotion counseling in in-patient and community settings. Students also have a community-based nursing class. Although students receive education concerning many aspects

of health promotion, it is not clear how often students are presented with the opportunity to practice physical activity counseling, and whether all students are provided the opportunity.

It is important for students to practice, observe and be coached in the behavior of physical activity counseling in order to gain self-efficacy. Self-efficacy, or self-confidence as per Bandura (137), is important because higher levels of self-efficacy are associated with greater involvement in an activity, as well as persistence and effort in performing that activity. According to Bandura, self-efficacy can be obtained by successfully performing a task, vicarious observation, or by verbal persuasion that one is capable of performing the task (137). In a study conducted on 55 third year nursing students, self-efficacy for carrying out health promotion activities with healthy families increased significantly following a clinical experience in community family nursing (138).

A study conducted by Laschinger et al. (139) that enrolled undergraduate nursing students examined their self-efficacy for carrying out health promotion activities with clients in nursing settings. Students in the first, second and fourth years of a university program rated themselves as moderately efficacious about knowledge and abilities for health promotion counseling in three content domains: smoking cessation, nutrition and exercise (139). Senior nursing students had the highest self-efficacy scores in health promotion counseling. However, irrespective of the year of their education, students were less efficacious about their ability to engage clients in health promotion counseling than they were about their knowledge for health promotion counseling (139).

Although there is evidence that nursing students have varying degrees of exposure to health promotion which may include physical activity counseling learning experiences, it is not clear how extensive the exposure, the opportunity for all students to have equal exposure to

physical activity counseling, nor the number of opportunities available to practice counseling. Also, even though the traditional undergraduate and second degree accelerated student do take the same classes, the second degree student has less time to practice and develop physical activity counseling skills; it is not known if they will differ in their practices, beliefs and self-efficacy in providing physical activity counseling. No current studies were found on American nursing student's beliefs, practices, and self-efficacy in relation to physical activity counseling. Research is needed to further examine whether senior baccalaureate nursing students feel they have knowledge of the current recommended physical activity guidelines for Americans, if they feel self-efficacious in counseling clients on these guidelines, and whether they believe that physical activity counseling is an important aspect of nursing.

3.0 METHODS

3.1 RESEARCH DESIGN

This study utilized a cross-sectional study design to explore baccalaureate nursing student's knowledge, self-efficacy, beliefs and practices in providing counseling on Physical Activity as a modifiable lifestyle behavior. A survey was developed to capture data from individual undergraduate nursing students in order to study the specific aims established in Chapter 1.

3.2 SUBJECTS

All University of Pittsburgh School of Nursing baccalaureate undergraduate nursing students who were not registered nurses were recruited to complete a survey. The University of Pittsburgh School of Nursing is accredited by the American Association of Colleges of Nursing (AACN) and thus follows its guidelines—*The BSN Essentials*—for curriculum development. Health promotion and disease prevention are part of the BSN Essentials guidelines for curriculum development, and thus education on physical activity that promotes disease prevention and minimizes progression should be included in the curriculum. All undergraduate nursing students of the University of Pittsburgh School of Nursing are required to take the same didactic nursing courses, but students differ in the number of clinical rotations they experience depending on

whether they are a traditional undergraduate nursing student or a second degree accelerated nursing student. The program requires 9 rotations (1,300 hours) in clinical sites for the traditional student and 8 rotations (960 hours) for the second degree accelerated student. Approval to conduct the study was obtained from the Institutional Review Board of the University of Pittsburgh and the School of Nursing. Based on current enrollment, approximately 600 students will be eligible to participate in the survey.

3.3 RECRUITMENT

All undergraduate unlicensed nursing students who attended the University of Pittsburgh School of Nursing during Spring Term 2013 were invited to participate in the study. The survey was administered once in six designated classes in order to encompass all students enrolled in the Spring 2013 term. The survey was administered at the end of a class, on a day and time approved by the six Primary Instructors. Permission to distribute the survey was obtained during a scheduled meeting that was followed by a written request. The written request reviewed the purpose of the study and provided a brief description (Appendix B).

On the day that the survey was given, the Primary Investigator presented a verbal explanation of the survey prior to the administration of the survey. Each student received a packet that included a written explanation of the purpose of the study (Appendix A). The verbal and written explanation included an invitation to participate in the research survey, assurance that the survey was voluntary, and that responses would be kept confidential and anonymous, with the exception of, the level of progression in their program (freshmen, sophomore, junior, senior), type of program, and not traceable to the individual respondent. All surveys were

numerically identified to enable data analysis by level of progression and the type of program (traditional versus second degree). The numerical coding was 01 for freshman, 02 for sophomores, 03 for juniors, and 04 for seniors. The student was informed that participation or non-participation in the study would not affect their grade or progression in the program. A collection bin was placed at the front of each classroom on the podium desk, and the students were asked to place their completed surveys in the bin.

3.4 SURVEY

The survey was adapted from an instrument used in a prior survey that assessed knowledge of acute care nurses regarding Physical Activity that was conducted by Dr. Gretchen Zewe (32). The survey instrument included 21 questions that requested demographic data (gender, ethnicity, prior degrees and field, if any), type of nursing program, year of training, self-reported time spent in engaging in physical activity, and perceived barriers to self-engagement in physical activity. In addition, questions were included that assessed:

1. The student's self-reported knowledge of the health benefits of physical activity, and of the Physical Activities Guidelines for Americans (Survey Questions 15 and 16).
2. The student's self-efficacy in providing counseling on physical activity (Survey Question 14).
3. The student's practices in providing counseling to patients on physical activity per clinic day, and setting of the clinical experience (Survey Question 10-13).
4. The student's beliefs related to whether or not it is the nurse's responsibility to provide physical activity counseling (Survey Question 17).

5. The student's prioritizing of physical activity counseling when ranked among 9 other healthy lifestyle behaviors (Survey Question 18).
6. The student's prioritization of providing physical activity counseling when ranked among 9 other patient care responsibilities (Survey Question 19).
7. The student's identification of barriers they perceive in nurse's counseling of patients related to physical activity (Survey Questions 20 and 21).

Face validity of the survey was obtained from two nurse experts in the field of exercise physiology and one expert in the field of nursing prior to finalizing the format of the scannable form of the survey.

3.5 ANTICIPATED RESPONSE RATE

A paper and pencil-based survey was chosen because prior studies have consistently shown that the response rate was higher when using this approach than an electronic surveys for the adult student. In prior studies, response rates have varied from 32.6% to 75.0% for paper and pencil surveys versus 20.0% to 47.0% for electronic surveys (140-142). In a study by Nulty, comparing response rates of paper to online surveys, the mean response rate was 56% when using a paper and pencil-based survey compared to 33% for online surveys (143). Some exceptions have been noted in courses using distance education, where response rates for electronic surveys have been slightly higher than for paper surveys (142). Several factors were also considered that could produce a higher return rate than the expected norm. The survey was administered in a classroom setting, and collected on-site immediately upon completion. Also, survey response rates have

been found to be higher among females, Caucasians, and those with high Scholastic Aptitude Test scores (144). Many of the University of Pittsburgh nursing students fit these characteristics.

Based on prior response rates, the timing and process used for distribution, and the likelihood that all students would not be present in class, the expected response rate was judged to be between 32.6 – 75%. The response rate for the study was determined by dividing the total number of the surveys returned by the total number of undergraduate unlicensed baccalaureate students attending the University of Pittsburgh School of Nursing in the Spring term of 2013.

3.6 DATA MANAGEMENT

A scannable form of the paper-based survey was created to aid in data management. The form design, data entry and data verification was performed in a Window-based software package for automated data entry and verification called Teleform. Oracle—a secure database (version 11g, Oracle Corp., Redwood Shores, CA) having security settings and password policy enforcement and maintained on a centralized server at the Network Operating Center, an off-site, 24/7 facility operated by the University of Pittsburgh—was used to export verified scanned data. Only the researcher involved in the study had access to the secured data.

3.7 STATISTICAL ANALYSIS

SPSS for Windows (version 20, IBM Corp., Armonk, NY) was used for data analysis. In analysis of this cross-sectional design, several statistical methods were applied. A frequency distribution was utilized to organize the data. Measures of central tendency were used to define the center of the data, and measures of variability to examine the degree to which the data varied. The measures of central tendency and variability used for Aims 1 through 4 were based on the scale of measurement for each variable and degree to which scores varied. Age of the student, other degrees, ethnicity and gender (nominal scaled variables) were summarized using the mode and range. The measures of central tendency and variability used for ordinal scale variables, e.g., year of training, program type, highest education level presently obtained, and Likert-scale responses were summarized using medians and semi-quartile ranges. Ratio scaled variables, e.g., age, personal activity, guideline recommendations and time spent counseling on physical activity were summarized using the mean and the standard deviation. If the data were found to not be normally distributed or have valid outliers, median and the semi-quartile range would be used to analyze the data.

When associations between (Specific Aim 6) academic status, (Specific Aim 7) type of undergraduate training program, and (Specific Aim 8) personal engagement in physical activity by the student were examined with the outcome variables knowledge of the 2008 Physical Activity Guidelines for Americans, self-efficacy in counseling, the importance the student nurse places on providing counseling on physical activity behavior compared to other lifestyle related behaviors and compared to other patient care responsibilities, as well as the perception of the student nurse on whether the nurse should provide physical activity counseling, an appropriate group comparative statistical method was applied. Analysis of variance along

with the mean and standard deviation was used to analyze ratio scaled outcome variables. If the distribution was found to not be normal, the non-parametric summary statistics were applied, specifically the median, semi-quartile range, and Kruskal-Wallis test was used to summarize continuous variables for groups of 3 or more, and the Mann Whitney U was utilized for groups of 2. For non-parametric categorical variables, Chi-squared or Fishers exact test was utilized to compare groups for differences. To adjust for multiple comparisons using ANOVA, Scheffe method was used. For multiple comparisons using Kruskal-Wallis or and Fisher's exact test, the Bonferroni correction was utilized.

4.0 RESULTS

This study was performed to characterize unlicensed baccalaureate students' self-report of their: knowledge of the current Physical Activity Guidelines, self-efficacy in providing physical activity education, and their beliefs and practices related to providing physical activity education. In addition, the study examined the influence of academic status within the nursing program, the type of program (traditional or second degree accelerated), and self-reported engagement in physical activity to determine whether these factors influenced student knowledge, self-efficacy in providing physical activity education, and beliefs and practices related to providing physical activity education. Demographic factors were obtained to describe the sample. The survey was administered over 5 days to undergraduate unlicensed baccalaureate student nurses at the University of Pittsburgh School of Nursing.

4.1 RESPONDENT CHARACTERISTICS

There was a possible sample of 606 students: of these, 558 were enrolled in the traditional program and 48 in the second degree accelerated program. Three students were not available, therefore the total possible number of respondents was 603. A total of 539 surveys were returned for an overall response rate of 89%. The response rate by program was 89% for the traditional

students and 94% for the accelerated second degree students. Table 1 summarizes the number of surveys distributed, and the return rate for each program.

Table 1: Response rate by program type

Variable	Total Possible Respondents	Surveys Returned	Response Rate
Traditional program	555	494	89.0%
2nd degree accelerated program	48	45	93.8%
Total respondents	603	539	89.4%

The current status of undergraduate unlicensed nursing students eligible to participate in the survey was 144 freshman, 169 sophomores, 151 juniors and 142 seniors. The majority of students in each level responded to the survey. All four levels achieved a response rate of greater than 80%. Table 2 summarizes the number of surveys distributed and the return rate for each academic level.

Table 2: Response rate by academic status in the program

Variable	Total Possible Respondents	Surveys Returned	Response rate
Freshman	144	144	100.0%
Sophomore	166	141	84.9%
Junior	151	138	91.4 %
Senior	142	116	81.7 %

The mean age of the undergraduate student body was 20.9 ± 3.0 years, and the mean age of the traditional versus the second degree student was 20.4 ± 1.9 and 27.1 ± 5.3 years, respectively. The subjects were predominantly female with 89.2% female and 10.8% male. Racial background of the undergraduate class was predominately Caucasian (90.4 %), followed by Asian (5.2%), African American (2.6%), Hispanic, Latino, Mexican, Cuban or Puerto Rican (1.3%), or Other ethnic or racial background (0.2%), and unknown 0.4 %. The highest educational level completed to this point by the majority of the students was a high school diploma (88.7%). A college level degree was obtained by 11.3% with 1.7 % earning an Associate's degree, 8.2 % a Baccalaureate degree, 1.3% a Master's degree, and 0.2 % a PhD. The majority of those with college degrees (73.8%) were second degree accelerated students. Thirty college level degrees were reported as being in a health or medical related field, and 24 degrees were non-medical or non-health related. Five degrees were specifically in exercise science, exercise physiology or physical activity. Seven degrees not specified as being health or medical related. Table 3 provides a summary of the demographic characteristics of the 539 respondents.

Table 3: Demographic characteristics of respondents

Variable	Total (N=539)	Traditional Program (N=494)	2nd Degree Accelerated Program (N=45)
Age (years)	20.9±3.0	20.4 ±1.9	27.1 ±5.3
Gender			
Female [N (%)]	479 (89.2%)	442 (89.7 %)	37 (84.1%)
Male [N (%)]	58 (10.8%)	51 (10.3%)	7 (15.9%)
Race/ethnicity			
Caucasian [N (%)]	487 (90.4 %)	446 (90.3 %)	41 (91.1%)
Asian [N (%)]	28 (5.2 %)	26 (5.3 %)	2 (4.4%)
African-American [N (%)]	14 (2.6%)	12 (2.4%)	2 (4.4%)
Hispanic/Latino/ Mexican, Cuban or Puerto-Rican [N (%)]	7 (1.3%)	7 (1.4%)	0 (0%)
Other [N (%)]	1(0.2 %)	1 (0.2%)	0 (0%)
Unknown [N (%)]	2 (0.4 %)	2 (0.4%)	0 (0%)
Highest Level of Education			
High School [N (%)]	478 (88.7%)	478 (96.8%)	0 (0%)
Associates [N (%)]	9 (1.7 %)	9 (1.8%)	0 (0%)
Bachelor [N (%)]	44 (8.2 %)	6 (1.2%)	38 (84.4%)
Master [N (%)]	7 (1.3%)	1 (0.2%)	6 (13.3%)
PhD [N (%)]	1 (0.2%)	0 (0%)	1 (2.2%)

The student nurses' self-report of their personal engagement in physical activity indicated that 95% engage in physical activity, with a mean reported activity of 196.4 ± 154.8 min/wk (Table 4). When examined by academic status, 97.9% of freshman, 92.2% of sophomores, 94.9% of juniors, and 94% of seniors reported engaging in physical activity of ≥20 min/wk. When examined by program, 96% of traditional students and 84.4% of second degree students reported engaging in physical activity of ≥20 min/wk. Using the criteria of engaging in ≥150 min/wk of physical activity, 51.9% of the nursing students self-reported engaging in this level of personal physical activity (Figure 1).

Table 4: Students reported personal engagement in physical activity in minutes per week.

Student's Self-Report of Time Spent per Week in Physical Activity (N=510)*	Response			
	Mean ± SD minutes/week	Median minutes/week	Mode minutes/week	Range minutes/week
Mean (SD)	196.4 ± 154.8	180	180	20-1440

* Data were missing for 29 students.

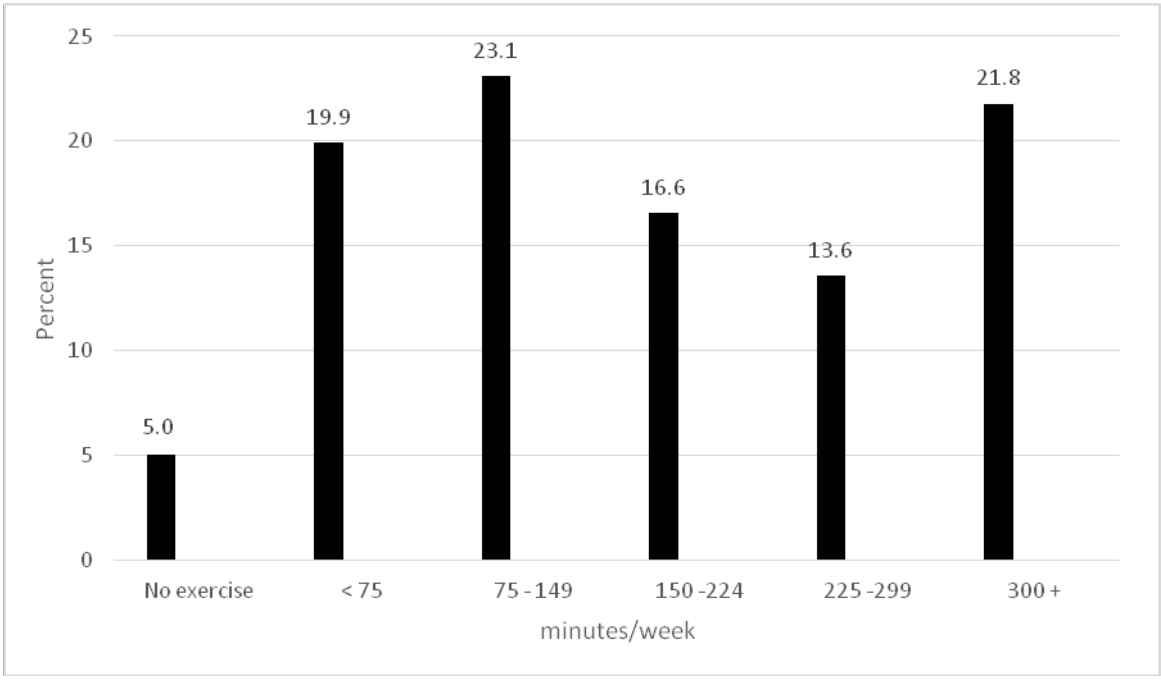

Figure 1: Percentage of student nurses engaging in different amounts of self-reported exercise (min/wk). Data were missing from 2 students.

4.2 AMOUNT OF PHYSICAL ACTIVITY RECOMMENDED TO PATIENTS BY STUDENT NURSES

The number of minutes that nursing students reported they would recommend to patients is shown in Table 5. The mean response was 141 ± 76 minutes per week, the median was 120 minutes per week, with a range of 0 to 800 minutes per week. Of these, 23.4 % of students provided an answer of 150 minutes per week, with an additional 24.5% providing a response of greater than 150 minutes per week. Thus, approximately half (47.9%) of the students provided a response that was consistent with the recommended ≥150 minutes per week of the Physical Activity Guidelines for Americans.

Table 5: Self-report of minutes per week of aerobic moderate-intensity physical activity recommended for promoting and maintaining health of Americans as per the current physical activity guidelines.

Student's Self-report of time that should be spent per week in aerobic moderate-intensity physical activity by Americans to promote or maintain health (N=535)*	Mean ± SD	Median	Mode	Range
	140.9 ± 76	120	150	0-800

*Data were missing for 4 students.

However, the range of responses was large (0-800 minutes). Therefore, responses were further examined in regard to the number of minutes cited. As shown in Figure 2, 43.6% of respondents provided an answer that ranged from 150 -299 minutes per week, 52% indicated a range of 1-149 minutes per week and less than 5% provided another answer.

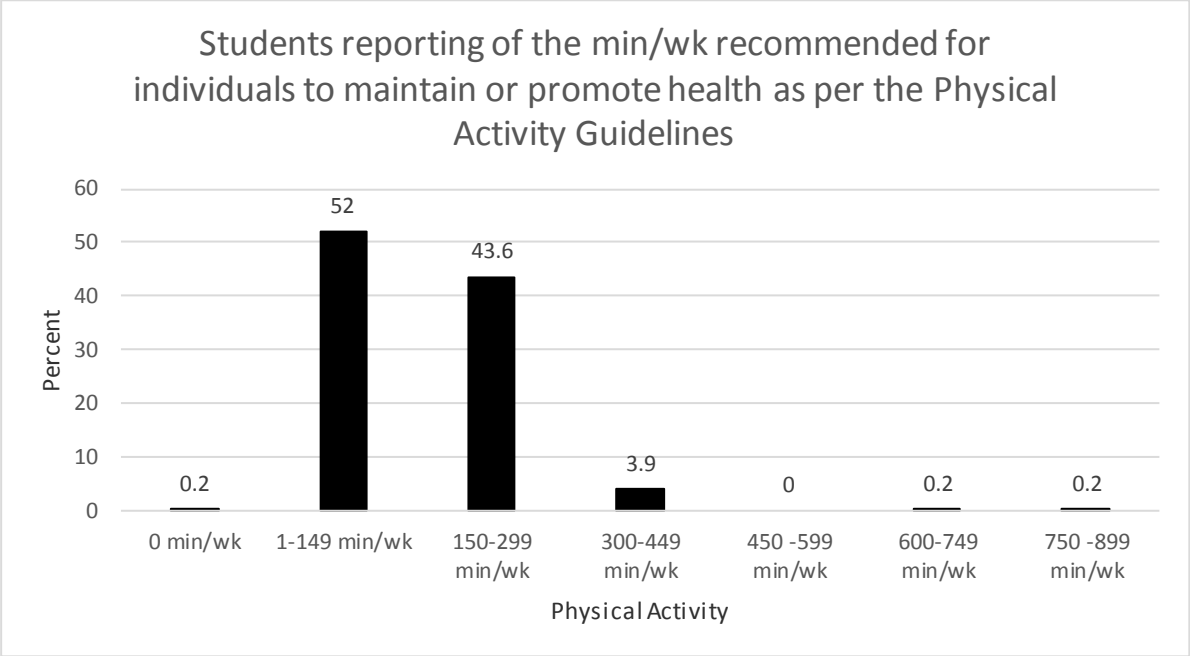

Figure 2: Percentage of student's self-report of the number of min/wk they would recommend to a patient to promote or maintain health

The influence of academic status, type of academic program, and personal physical activity on the amount of physical activity that student nurses would recommend to patients was also examined (Table 4). There was a significant effect of academic status on student self-reported recommendations (p =.011), with post-hoc analysis showing a significant difference between juniors (128.2± 59.7 min/wk) and seniors (158.2 ± 79 min/wk) (p=0.020). Senior students were more likely to report a number within the recommended range than the junior student. There was no significant difference in the amount of physical activity that would be recommended by student nurses based on type of program (traditional vs. accelerated), or on the level of personal physical activity behavior.

Table 6: Amount of physical activity that student nurses would recommend to patients by academic status, type of academic program, and personal physical activity behavior.

Grouping Variable	Classification	Mean ± Standard Deviation	P-Value
Academic Status	Freshman (N=144)	139.3±82.8	.011
	Sophomore (N=138)	140.7±78.5	
	Junior (N=137)	128.2±59.7[A]	
	Senior (N=116)	158.2 ±79 [A]	
Type of Program	Traditional (N=490)	142.1±77.3	.299
	Accelerated (N=45)	128.0±59.9	
Personal Physical Activity Behavior	No Exercise (N=27)	123.9 ±47.2	.463
	<75 min/wk (N=107)	138.0±74.8	
	75-149 min/wk (N=124)	135.9 ±64.6	
	150-224 min/wk (N=87)	141.4 ±62.6	
	225-299 min/wk (N=72)	156.3 ±86.6	
	≥300 min/wk (N=116)	143.5±94.1	

NOTE: Groups with same subscript are significantly different at p<.05

Students were also asked to identify whether they perceived physical activity to be an effective strategy for the prevention or treatment of eight chronic conditions (Figure 3). A high percentage of the student nurses responded that physical activity was effective for the prevention or treatment of obesity (99.6%), heart disease (98.5%), depression (95.4 %), diabetes (94.1 %), and early mortality (93.7 %). For prevention and treatment of stroke or pulmonary disease, physical activity was seen as an effective treatment by 83.5 % and 82.6 % of the students, respectively. Knowledge that physical activity was effective for prevention or treatment of cancer was reported by 64.6 % of respondents.

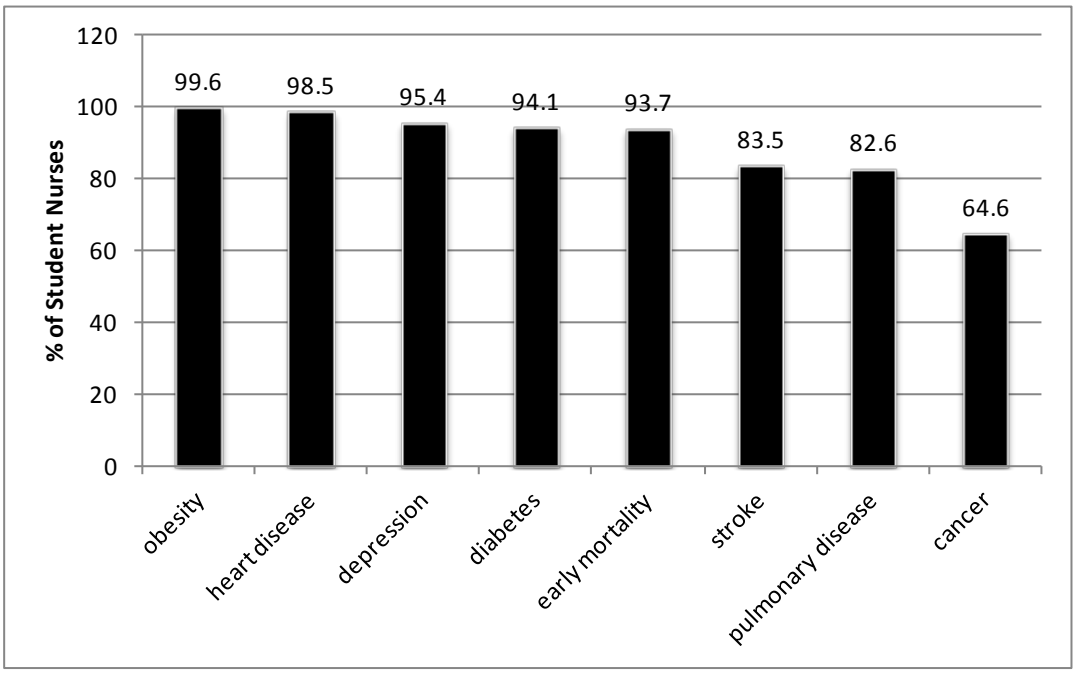

Figure 3: Percentage of student nurses identifying physical activity as effective in preventing or treating chronic diseases or health-related conditions.

4.3 SELF-EFFICACY IN EDUCATING PATIENTS ON PHYSICAL ACTIVITY

Undergraduate students were asked to rate their self-efficacy in providing physical activity education to their patients on a seven point Likert scale (1=strongly disagree to 7= strongly agree). The mean was 4.4 ± 1.5 and the mode was 4, with 25.8% of the students responding as having only minimal confidence in providing physical activity education. The majority of the students (74.2 %) reported having partial to strong confidence in providing physical activity education. Figure 4 presents respondents' self-ranking of their self-efficacy in providing physical activity education.

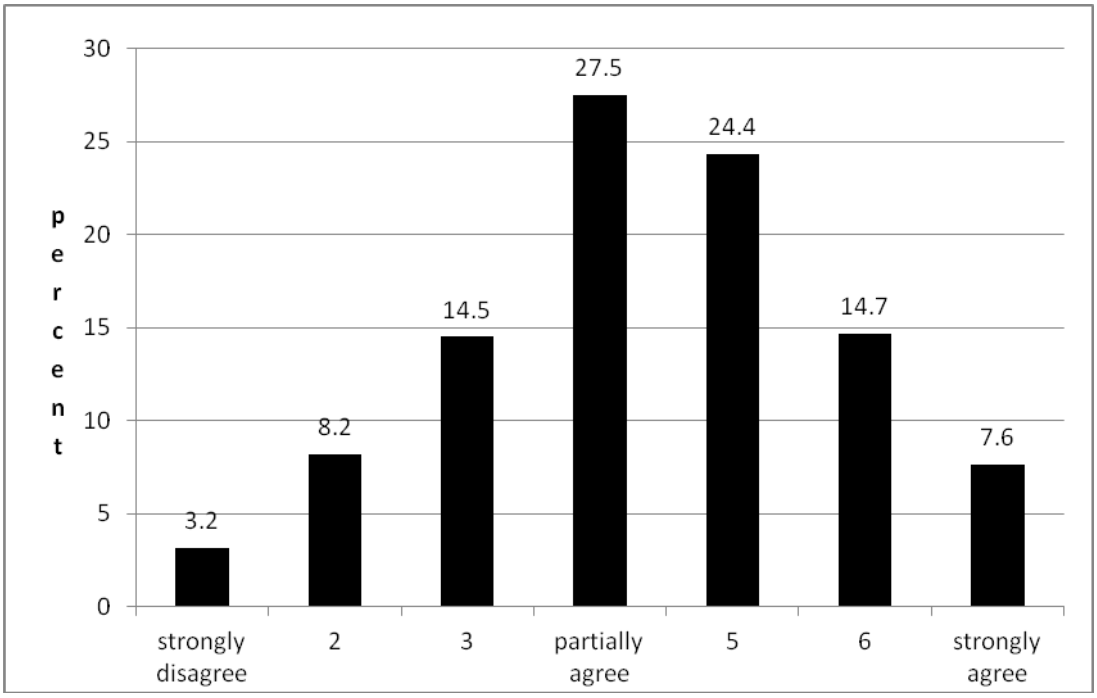

Figure 4: Student reported self-efficacy in providing education to patients related to physical activity.

The influence of academic status, type of academic program, and personal physical activity on self-efficacy in order for student nurses to counsel patients on physical activity was

examined (Table 7). There was a significant effect of academic status ($p<0.001$), with post-hoc analysis showing that the self-efficacy to counsel patients on physical activity was significantly lower in freshman compared to sophomores, juniors, and seniors. Nursing students in the traditional program also had lower self-efficacy in counseling patients on physical activity compared to those in the accelerated program ($p=0.003$). Nursing students reporting <75 min/wk of personal physical activity had a lower self-efficacy to counsel patients on physical activity compared to those reporting ≥150 min/wk of personal physical activity. Those reporting 75-149 min/wk had lower self-efficacy than those reporting ≥300 min/wk ($p<0.001$).

Table 7: Self-efficacy of student nurses to counsel on physical activity by academic status, type of academic program, and personal physical activity behavior.

Grouping Variable	Classification	Mean ± Standard Deviation	P-Value
Academic Status	Freshman (N=144)	3.7 ± 1.6^{ABC}	<.001
	Sophomore (N=141)	4.5 ± 1.4^{A}	
	Junior (N=137)	4.7 ± 1.4^{B}	
	Senior (N=116)	4.8 ± 1.2^{C}	
Type of Program	Traditional (N=493)	4.3±1.5	.003
	Accelerated (N=45)	5.0±1.2	
Personal Physical Activity Behavior	No Exercise (N=29)	4.1±1.5	<.001
	<75 min/wk (N=107)	3.8 ± 1.6^{ABC}	
	75-149 min/wk (N=123)	4.2 ± 1.3^{D}	
	150-224 min/wk (N=89)	4.5 ± 1.2^{A}	
	225-299 min/wk (N=73)	4.6 ± 1.5^{B}	
	≥300 min/wk (N=117)	5.0 ± 1.4^{CD}	

NOTE: Groups with same subscript are significantly different at $p<.05$

4.4 PHYSICAL ACTIVITY EDUCATION COMPARED TO OTHER LIFESTYLE BEHAVIORS

Student nurses ranked physical activity with nine other lifestyle health-related behaviors which were: smoking cessation, medical compliance, a healthy diet, moderation with alcohol ingestion, weight management, immunizations, stress management, and adequate sleep in order of priority when they are educating a patient. Their responses were based on the mean item rank in which the lowest mean rank is the lifestyle behavior being the highest priority (Table 8). Physical activity, with a mean rank of 4.4 ± 2.3, was ranked fourth in priority when the student nurse was providing education to the patient on lifestyle health-related behaviors. Items identified by the student nurses with a higher priority than physical activity were educating patients on a healthy diet (3.9 ± 2.2), smoking cessation (4.0 ± 2.5), and medical compliance (4.0 ± 3.1). Items with a lower priority than physical activity as ranked by the student nurses were weight management (5.3 ± 2.3), hand washing safety (mean rank 6.1 ± 3.1), immunizations (6.1 ± 3.0), adequate sleep (6.5 ± 2.3), stress management (7.2 ± 2.3), and moderation with alcohol intake (7.4 ± 2.4).

Table 8: Ranked importance for 10 lifestyle behaviors requiring education by undergraduate baccalaureate student nurses (1 = most important; 10 = least important)

Variable	Mean ± SD
Healthy diet	3.9 ± 2.2
Smoking cessation	4.0 ± 2.5
Medical compliance	4.0 ± 3.1
Physical activity	4.4 ± 2.3
Weight management	5.3 ± 2.3
Hand washing	6.1 ± 3.1
Immunizations	6.1 ± 3.0
Adequate sleep	6.5 ± 2.3

Stress management	7.2 ± 2.3
Moderation with alcohol intake	7.4 ± 2.4

The influence of academic status, type of academic program, and personal physical activity on the importance that student nurses give to physical activity compared to other lifestyle behaviors was next examined (Table 9). There was a significant effect of academic status ($p<0.001$), with post-hoc analysis showing that the freshmen ranked physical activity higher compared to the other lifestyle behaviors (3.9 ± 2.2) compared to juniors (4.8 ± 2.2) and seniors (5.0 ± 2.4). Sophomores ranked physical activity higher compared to other lifestyle behaviors (4.1 ± 2.2) compared to seniors (5.0 ± 2.4). There was a trend for nursing students in the traditional program to rank physical activity higher (4.4 ± 2.3) compared to those in the accelerated program (5.0 ± 2.2) ($p=0.053$). There was also a significant effect of student nurse's level of personal physical activity on the importance placed on physical activity ($p=0.005$), with those reporting ≥300 min/wk ranking physical activity higher (3.8 ± 1.2) than those reporting no exercise (5.5 ± 2.5), or those reporting 75-149 min/wk (4.6 ± 2.2) of personal physical activity.

Table 9: Student nurse ranking of physical activity with other lifestyle behaviors by academic status, type of academic program, and personal physical activity behavior.

Grouping Variable	Classification	Mean ± Standard Deviation	P-Value
Academic Status	Freshman (N=139)	3.9 ± 2.2^{AB}	<.001
	Sophomore (N=134)	4.1 ± 2.2^{C}	
	Junior (N=137)	4.8 ± 2.2^{A}	
	Senior (N=114)	5.0 ± 2.4^{BC}	
Type of Program	Traditional (N=479)	4.4±2.3	.053
	Accelerated (M=45)	5.0±2.2	
Personal Physical Activity Behavior	No Exercise (N=25)	5.5 ± 2.5^{A}	.005
	<75 min/wk (N=104)	4.4±2.0	

	75-149 min/wk (N=121)	4.6±2.2[B]	
	150-224 min/wk (N=88)	4.4±2.3	
	225-299 min/wk (N=71)	4.8±2.8	
	≥300 min/wk (N=113)	3.8±1.2[AB]	

NOTE: Groups with same subscript are significantly different at p<.05

4.5 PHYSICAL ACTIVITY EDUCATION COMPARED TO OTHER PATIENT CARE ACTIVITIES

Table 4.10 represents the ranking given to providing physical activity education in comparison with nine other patient care responsibilities. The patient care responsibilities listed were: 1) patient assessment; 2) performing treatments; 3) passing medications; 4) checking physician's orders; 5) coordinating patient care; 6) documentation; 7) explaining the daily plan of care; 8) patient family teaching; and 9) giving discharge instructions. Prioritization was determined by mean rank (Table 10). Providing physical activity education was ranked as a low priority (8.5 ± 1.7) compared to other care responsibilities. Items ranked higher than physical activity education by the students nurses were: performing patient assessments (2.1 ± 1.8), performing treatments (3.7 ± 2.0), passing medications (4.0 ± 2.1), checking physician orders (4.4 ± 2.1), coordinating patient care (5.5 ± 2.5), documentation (5.7 ± 2.3), explaining the daily plan of care (5.7 ± 2.5), and patient/family education (6.7 ± 2.2). Only providing discharge instructions (8.5 ± 1.8) was ranked as a lower priority in care responsibilities than physical activity education.

Table 10: Rank of importance for ten patient care activities by undergraduate baccalaureate student nurses (1 = most important; 10 = least important)

Variable	Mean ± SD
Patient assessment	2.1± 1.8
Performing treatments	3.7± 2.0
Passing medications	4.0± 2.1
Checking physician's	4.4± 2.1
Coordinating patient care	5.5± 2.5
Documentation	5.7± 2.3
Explaining the daily plan	5.7± 2.5
Patient/family education	6.7± 2.2
Counseling on physical	8.5± 1.7
Giving discharge	8.5± 1.8

The influence of academic status, type of academic program, and personal physical activity on the importance that student nurses give to physical activity education compared to patient care activities was examined (Table 11). There was no significant effect of academic status, type of program (traditional vs. accelerated), or level of personal physical activity behavior on the importance placed on physical activity education compared to the other patient care activities.

Table 11: Student nurses ranking of physical activity education with other patient care responsibilities by academic status, type of academic program, and personal physical activity behavior.

Grouping Variable	Classification	Mean ± Standard Deviation	P-Value
Academic Status	Freshman (N=137)	8.2±1.9	.176
	Sophomore (N=134)	8.4±1.7	
	Junior (N=137)	8.7±1.5	
	Senior (N=112)	8.6±1.7	

Type of Program	Traditional	8.5±1.7	.120
	Accelerated	8.8±1.5	
Personal Physical Activity Behavior	No Exercise (N=27)	8.9±2.0	.181
	<75 min/wk (N=107)	8.7±1.6	
	75-149 min/wk (N=124)	8.6±1.6	
	150-224 min/wk (N=87)	8.5±1.7	
	225-299 min/wk (N=72)	8.4±1.7	
	≥300 min/wk (N=116)	8.2±1.9	

4.6 PERCEIVED ROLE OF THE NURSE TO PROVIDE PHYSICAL ACTIVITY COUNSELING

Students were probed as to whether or not providing physical activity counseling to the patient was considered a nurse's role**.** Both traditional and second degree accelerated student nurses together (97.6%) felt it was the nurse's job to counsel a patient on physical activity. Only 2.4% of the students reported that they did not believe it was the nurse's role to counsel a patient on physical activity. The influence of academic status, type of academic program, and personal physical activity on the percentage of student nurses who perceived that the nurse should provide physical activity counseling was also examined (Table 12). There was a significant effect between academic status, and on the percentage of student nurses reporting that the nurse should provide physical activity counseling (p=.015). However, post hoc analysis utilizing Bonferroni shows no significant differences between pairwise comparisons of groups.

The level of personal physical activity behavior on the percentage of student nurses reporting that the nurse should provide physical activity counseling was trending toward significance (p = .052) with the students who exercised ≥ 300 minutes per week responding "yes" that the nurse's role is to provide physical activity counseling more often than the students who do not exercise (p=.034), and the students who exercised 150 -224 minutes per week (p=.034). There was no significant effect of the type of program (traditional vs. accelerated) on the percentage of student nurses reporting that the nurse should provide physical activity counseling.

Table 12: Percent of student nurses indicating that physical activity counseling is a nurses' role by academic status, type of academic program, and personal physical activity behavior.

Grouping Variable	Classification	% of students with yes responses	P-Value
Academic Status	Freshman (N=144)	99.3%	.015*
	Sophomore (N=141)	95.0%	
	Junior (N=138)	96.4%	
	Senior (N=116)	100.0%	
Type of Program	Traditional (N=494)	97.8%	.297
	Accelerated (N=45)	95.6%	
Personal Physical Activity Behavior	No Exercise (N=27)	92.6%	.052
	<75 min/wk (N=107)	99.1%	
	75-149 min/wk (N=124)	96.8%	
	150-224 min/wk (N=89)	95.5%	
	225-299 min/wk (N=73)	97.3%	
	≥300 min/wk (N=117)	100.0%	

*Indicates that post-hoc tests revealed no significant between group differences.

4.7 PHYSICAL ACTIVITY COUNSELING PRACTICES BY THE STUDENT NURSE

An inpatient clinical experience that involved educating a patient on physical activity was reported by only 164 students, or 30.4% of the student body. Within the undergraduate nursing program, both traditional and second degree included, freshman student nurses had significantly ($p<.001$) fewer inpatient experiences, an expected finding though as clinical is not included in the freshman year. Only 2.1% of the freshman nursing students as opposed to 41.8% of the sophomores, 42.0% of the juniors, and 37.9% of the seniors had reported that they had an opportunity which involved physical activity counseling in the inpatient setting. There was no significant difference noted between the student's reported frequency of performing physical activity education ($p = .489$), or minutes in which they educated a patient on physical activity ($p=.704$) (Table 13).

Table 13: Students' practices in counseling or educating a patient on physical activity in required in-patient settings.

	Freshman	Sophomore	Junior	Senior	p-value
Students responding "yes" to having a training experience related to physical activity counseling	2.1% N = 3	41.8% N = 59	42.0% N= 58	37.9% N = 44	<.001
Students responding "yes" to providing physical activity counseling	1.34% N = 2	19.2% N = 27	22.5% N = 31	22.4% N = 26	.489
Minutes spent per patient in physical activity counseling	12.5±3.5 N = 2	10.0±7.1 N = 26**	11.0±8.1 N = 31	10.4±10.9 N = 26	.704

**Data for 1 subject is missing

Far fewer students had an opportunity to have an experience in which they were involved in physical activity education in the outpatient setting. Only 56 students or 10.4% reported having this experience. A significant difference was found with the status of the nursing student within the program, and their having a training experience involving counseling or educating a patient related to physical activity (p<.001). Freshmen and sophomores had significantly fewer experiences than junior and senior nursing students. Only 29 (5.4%) students had the opportunity to perform physical activity education within the outpatient setting. Status within the nursing program did not influence performing education (p=.405), nor did it influence the minutes spent performing education (p=.423) in the outpatient clinical setting (Table 14).

Table 14: Students' practices in counseling or educating patients on physical activity in the outpatient setting.

	Freshman	Sophomore	Junior	Senior	p-value
Students responding "yes" to having a training experience related to physical activity counseling	2.1% N=3	4.3% N=6	18.1% N=25	19.0% N=22	<.001
Students responding "yes" to providing physical activity counseling	1.4% N=2	2.1% N=3	8.0% N=11	11.2% N=13	.405
Minutes spent per patient in physical activity counseling	15.0±7.1 N=2	8.3±2.9 N=3	21.2±33.4 N=10	9.2±7.4 N=13	.423

A total of 57 (10.6%) students reported that they had additional experiences outside of their required academic training program. Junior and senior students had significantly more experiences than the freshman students (p =.001). One outlier in a junior student's report of the

minutes spent per patient in physical activity counseling was noted and discarder before analysis for differences in groups was performed. No significant difference was found among the 35 (6.5%) students who reported giving physical activity education in respect to their status within the program (p= .094), or time spent performing physical activity education (p=.721). Table 15 represents the influence of the status of the student within the undergraduate nursing program on additional practices the student may have had in counseling, or educating a patient on physical activity outside of the required clinical setting.

Table 15: Students' additional practices in counseling or educating a patient on physical activity outside of the required clinical setting.

	Freshman	Sophomore	Junior	Senior	p-value
Students responding "yes" to having a training experience related to physical activity counseling	2.8% N=4	9.2% N=13	15.2% N=21	16.4% N=19	.001*
Students responding "yes" to providing physical activity counseling	1.4% N=2	5.0% N=7	7.3% N=10	13.8% N=16	.094*
Minutes spent per patient in physical activity counseling	7.5±3.5 N=2	19.6±20.4 N=7	10.3±10.3 N=10	11.4±7.1 N=16	.721

*indicates that p-value is from chi-square analysis

The opportunity for the student to observe nurses in educating patients on physical activity was examined. Twenty-one percent of the students reported that they never had the

opportunity to observe nurses educating patients on physical activity. For those students who did have the opportunity to observe nurses, 30% reported that they did not observe the nurse in providing physical activity education, 41% reported they sometimes observe the nurse providing physical activity education, and 7% reported they often observe the nurse providing physical activity education to the patient.

4.8 BARRIERS TO PHYSICAL ACTIVITY EDUCATION OR ENGAGEMENT

The most significant barrier that nurses confront in educating patients on physical activity was "no time", which was reported by 47.1% of student nurses. Nurse's lack of knowledge (25.5%) and patients not being motivated 18.1% were the second and third most reported major barriers. Tied for fourth as the most significant barriers mentioned were nurses are overweight (16.8%), and physical activity counseling is not a priority (16.8%). Table 16 summarizes the top five most significant barriers that students perceived in providing physical activity education.

Table 16: Self-reported barriers for nurses in providing physical activity education.

Barriers	Percent reporting barrier N =459
No time	47.1%
Nurses lack knowledge	25.5%
Patients not motivated	18.1%
Not a priority	16.8%
Nurses are overweight	16.8%

Some additional barriers for nurses in providing physical activity education that were reported by the students included: 1) education will not change the patient's behavior (12.4%); 2)

fear of offending the patient (8.3%); 3) lack of self-efficacy in performing physical activity education (7.2%); 4) medical or physical condition of the patient (7.2%); and 5) it is not a nurse's job (5.5%), along with several other barriers presented in Table 17.

Table 17: Additional barriers for nurses in providing physical activity education.

Barriers	Percent reporting barrier
Education will not produce change	12.4%
Fear of offending a patient	8.3%
Medical or physical condition	7.2%
Lack of self-efficacy in counseling on physical activity	7.2%
Not a nurse's job	5.5%
Denial of need to exercise	3.3%
Language barrier/health literacy	2.6%
Socioeconomic reasons	2.4%
Lack of teaching resources	1.6%
Patient already knows about physical activity	0.9%
Age	0.7%
Nurses are fatigued	0.4%

In addition, students reported barriers that hinder them from engaging in physical activity. The most perceived barrier was lack of time to exercise as reported by 89.6% of the students. The second most perceived barrier was lack of motivation (52.1%), and the third being that exercise is inconvenient (17.1%). Other barriers that the student reported in order of their rank were: unable to exercise due to health reasons (7.6%), need a day off for recovery (1.7%), environmental barriers such as weather (1.5%), school work (1.1%) and sleep deprivation (1.1%). All other barriers reported were representative of less than 1% of the students. (Table 18).

Table 18: Barriers to students engaging in physical activity.

Barriers to student self-engagement in physical activity	Percent reporting barrier
Lack of time	89.6%
Lack of motivation	52.1%
Exercise is inconvenient	17.1%
Health reasons	7.6%,
Recovery days required	1.7%
Environmental barriers such as weather	1.5%
School work	1.1%
Sleep deprivation	1.1%

5.0 DISCUSSION

5.1 INTRODUCTION

Chronic disease is the leading health care problem in America. Knowing that physical inactivity, a modifiable risk factor, is a strong determinant of chronic disease, it is imperative that healthcare providers be actively involved in educating their patients in order to increase their physical activity. Multiple recommendations have been made for physical activity promotion to be included into routine clinical practices (6, 121, and 122). As early as 1995, the American Nurses Association identified health promotion as a fundamental concept in nursing (145). In addition, nursing programs have been placing more emphasis on health promotion within the curriculum.

Physical activity, a health promoting behavior, is an integral behavior that patients should receive counseling on to improve or maintain their health. If healthcare providers, specifically nurses, are expected to provide physical activity counseling, it would be imperative that the nurse possess the correct knowledge of the current physical activity guidelines, knowledge of the health benefits that physical activity can provide, and self-efficacy in how to counsel patients related to physical activity. Additionally, nurses should perceive physical activity counseling as a priority when counseling a patient on lifestyle behaviors, as well as when performing patient care.

This study explored unlicensed undergraduate baccalaureate nursing student's: 1) knowledge of the current physical activity guidelines, 2) self-efficacy in educating or counseling patients on physical activity, 3) beliefs related to physical activity counseling, and 4) practices related to physical activity. In addition, the influence of the student's academic status within the nursing program, their type of program in which they are currently enrolled, and their personal engagement in physical activity was explored to determine the effect of these factors on these outcomes. The findings from this study were as follows:

1. Only 47.9% of the student nurses provided a response that was consistent with the recommended $\geq$150 minutes per week of the Physical Activity Guidelines for Americans. Academic status did influence the students providing a response consistent with the recommended $\geq$150 minutes per week. A significant effect between academic status and of the amount of physical activity that would be recommended by the student nurses ($p=.011$), with post-hoc analysis showing a significant difference between juniors (128.2±59.7 min/wk) and seniors (158.2±79.0 min/wk) ($p=0.020$). There was no significant difference in the amount of physical activity that would be recommended by student nurses based on the type of program (traditional vs. accelerated), or on the level of personal physical activity behavior.
2. Seventy-four percent of the students reported that they had moderate-to-strong self-efficacy in providing counseling on physical activity. There was a significant effect of academic status ($p<0.001$), with post-hoc analysis showing that the self-efficacy to counsel patients on physical activity was significantly lower in freshmen compared to sophomores, juniors, and seniors. Traditional students were also less confident than the accelerated second degree student. Self-engagement in exercise also influenced the

student's self-efficacy on physical activity counseling. Nursing students reporting engagement in <75 min/wk of personal physical activity had lower self-efficacy to counsel patients on physical activity compared to those reporting ≥150 min/wk of personal physical activity, and those reporting 75-149 min/wk of physical activity having lower self-efficacy than those reporting ≥300 min/wk of personal physical activity ($p<0.001$).

3. Students ranked physical activity as fourth in priority among other lifestyle counseling behaviors. Freshmen ranked physical activity higher than juniors and seniors in priority when providing counseling on lifestyle behaviors. Also, sophomores ranked physical activity counseling as being more important than seniors. The personal physical activity of the student also influenced the importance placed on physical activity counseling compared to other lifestyle behaviors, with those reporting ≥300min/wk ranking physical activity higher than those reporting no exercise or those reporting 75-149 min/wk of personal physical activity.
4. Physical activity counseling was ranked second to last among nine other patient care responsibilities by the students. Academic status, type of program and self-engagement in exercise by the student had no influence on their ranking of physical activity counseling among the nine other patient care responsibilities.
5. Both traditional and second degree accelerated student nurses together (97.6%) felt it was the nurse's job to counsel a patient on physical activity. There was a significant effect between academic status, and on the percentage of student nurses reporting that the nurse should provide physical activity counseling ($p=.015$). However, post hoc analysis showed no significant difference between pairwise comparisons of the groups.

6. Students reported minimal clinical or additional outside clinical experiences in physical activity counseling. Only 30% of the students reported in-patient clinical experiences in physical activity counseling. Far fewer students (10%) reported an outpatient experience, and 10 % reported an additional experience outside the clinic in physical activity counseling.
7. Of the student nurses who did have the opportunity to observe nurses educating patients, 30% reported that they did not observe the nurse in providing physical activity education, 41% reported they sometimes observed the nurse providing physical activity education, and 7% reported they often observed the nurse providing physical activity education to the patient.
8. The most frequent barriers reported by the students to a nurse providing physical activity counseling was lack of time (47%), knowledge deficit (25%), and no motivation by the patient (18%).
9. The students most frequently reported barriers to personal engagement in physical activity were lack of time (90% of students), lack of motivation (52% of students), and exercise is inconvenient (17% of students).

5.2 RESPONSE RATE

A poll of 603 students were available for the survey, with 539 completing the survey. The expected response rate for student paper-based surveys was 32.6% to 75.0% (140-142). The return rate for the survey surpassed expectations, with a response rate of 89%; the traditional and accelerated second degree student's return rates were 89% and 94%, respectively. The high

return rate was similar to a paper-based survey performed on student nurses concerning their opinions about the health promotion practices in which the return rate was 89% (41). Response rates to surveys have not been found to be as high for nurses. Van Geest and Johnson conducted a systematic review of nurses' response rates to questionnaires, and reported that the response rates were as low as 60% (146). Other studies in which nurses were surveyed recently on physical activity counseling have evidenced both high and low return rates. Zewe administered a paper-based survey to acute care nurses and received a 74% response rate (32). Whereas, Ingel conducted an electronic-based survey and had only a 13.8% response rate from nurses (147). In a study by Nulty which compared response rates of paper to online surveys, the mean response rate was 56% when using a paper and pencil-based survey compared to 33% for the online surveys (143). The high return rate in the current study may be partially related to the survey being paper-based, or due to the time the survey was issued. The survey was administered during finals week, ensuring that almost all of the students would be present. Also, the majority of the students were female and Caucasian, which had been shown in a previous study to positively influence survey return rates from students (144).

5.3 UNDERGRADUATE UNLICENSED BACCALAUREATE STUDENT NURSES' KNOWLEDGE OF THE CURRENT PHYSICAL ACTIVITY GUIDELINES FOR AMERICANS

The 2008 Physical Activity Guidelines for Americans recommend that adults engage in a minimum of 150 minutes per week of moderate-intensity aerobic activity to maintain or promote health (5). However, estimates indicate that less than 50% of adults in the United States meet

these recommended levels (8). Physical activity counseling by physicians is low, with approximately one-third of patients reporting that their physician advised them to be physically active (23). Thus, there is a need to implement more effective intervention strategies to promote engagement in physical activity.

Nurses have become involved in counseling patients on physical activity. Several studies performed on physical activity counseling and nursing indicated that nurses had reported that they are counseling patients on physical activity (32,147, 130). Ingel (147) investigated physical activity counseling behaviors among nurses who work in primary care, home care, or public health settings, and found that 81% of the nurses reported that they provide physical activity counseling. Zewe (32) reported that acute care nurses spend 24 minutes per day providing physical activity counseling. However, within these studies, the nurse's self-reported knowledge of the current physical activity guidelines has not been optimal.

Zewe (32) conducted a descriptive study on acute care nurses and their knowledge of the physical activity guidelines, and found that a substantial number of nurses did not possess the correct information related to the then current physical activity guidelines. The nurses were asked to report their knowledge of the current physical activity guidelines by indicating first the minutes per day, and then the number of days of the week one should exercise to obtain health benefits. Approximately 67.5% of these acute care nurses underestimated the number of days of the week in which to engage in physical activity, and 17.1% did not identify the correct number of minutes per day of aerobic activity recommended by the guidelines for Americans (32). In addition, 40% of the acute care nurses identified that a knowledge deficit about the current physical activity guidelines was a barrier to counseling (32). Zewe surmised that the nurse's knowledge related to the guidelines may have not been optimal due to the nurse not receiving

adequate education of the current physical activity guidelines in their respective training programs (32). Roughly 61% of Nurse Practitioners reported that they did not receive education on physical activity counseling as part of their formal education, and had to seek additional training in order to counsel patients on physical activity (130). In contrast, Ingel found that 60% of primary care nurses were able to report, as per the current physical activity guidelines, the recommended $\geq$ 150 minutes per week of physical activity which was higher than previous studies (147). Also, Ingel found that the level of the nurse's training or level of nursing education did not influence the nurse's knowledge of the current physical activity guidelines (147).

In this current study, when examining the student nurses' knowledge of the current physical activity guidelines, the results are modest at best. Only 48% of undergraduate baccalaureate student nurses reported knowledge that was consistent with the current physical activity guidelines. The students' knowledge of the current guidelines only differed between the junior and senior nursing students, with senior students having greater knowledge of the guidelines. The senior student's knowledge of the guidelines, however, did not differ from the freshmen or the sophomore students, indicating possibly no growth in knowledge of the physical activity guidelines. This may indicate that students may be receiving information concerning the physical activity guidelines early in the curriculum with the focus shifting to acute care in the junior year, with some focus returning to health promotion in the senior year. The type of program the student was enrolled in did not influence the student's knowledge of the guidelines for physical activity.

While physical activity counseling is perceived to be a role of the nurse, these finding on professional and student nurses indicate that nurses may not have been prepared within their training programs to teach, or counsel patients on physical activity. Benson and Latter (148)

noted that skills necessary to counsel patients must be integrated into nursing curricula to see the transfer of concepts such as health promotion into practice. Therefore, the preparation for the role of the nurse to be able to counsel and educate must receive a greater emphasis in the nursing curriculum. Currently, many of the nursing regulatory bodies do not prescribe to specific years that teaching content on health promotion be included in the curriculum (149). Lask et al. (150) studied four nursing schools in England, and concluded that courses related to health promotion were found to be concentrated within the first few months of the training program, and thereafter diminished in importance and emphasis. The timing of when physical activity and counseling information is included in the nursing program curriculum, and how this timing influences the knowledge and practice of nursing students and professionals warrants systematic investigation. This may provide information on the need for more education and emphasis on health promotion, specifically—physical activity counseling across all academic status levels may be needed, especially in the upper levels, in order to improve the student's knowledge of the current physical activity guidelines.

There was no difference between the level of personal engagement in physical activity by the student and the student's knowledge of the guidelines. This finding is consistent with a recent study in which personal physical activity of nurses was found not to have influenced the nurses' knowledge of the physical activity guidelines (147). In contrast, Zewe found that critical care nurses who engaged in physical activity themselves were significantly more likely to have knowledge of the current physical activity guidelines (32). Also, Abramson et al., found that physicians who exercise regularly are more likely to provide physical activity counseling and counseling on the benefits of physical activity (151). These inconsistent findings regarding the

influence of personal physical activity of nurses on their ability and willingness to counsel patients on physical activity warrants further investigation.

5.4 UNDERGRADUATE UNLICENSED BACCALAUREATE STUDENT NURSES' SELF-EFFICACY IN EDUCATING PATIENTS RELATED TO PHYSICAL ACTIVITY

It is important for the student to practice, observe and be coached in the behavior of physical activity counseling in order to gain self-efficacy. Self-efficacy, or self- confidence as per Bandura (137), is important because higher levels of self-efficacy are associated with greater involvement in an activity such as providing education, as well as persistence and effort in performing that activity. According to Bandura, self-efficacy can be obtained by successfully performing a task, vicarious observation, or by verbal persuasion that one is capable of performing the task (137). Laschinger and Tresolini (152) reported that nursing students increased their self-efficacy from learning about health promotion strategies in class, and through application in the clinical setting. However, contrary to Bandura's observation, Laschinger and Tresolini (152) reported that a role model was the least helpful source of self-efficacy information for students (152).

It is apparent in this current study that students had minimal opportunities to provide education related to physical activity or to observe others, specifically nurses, educating patients related to physical activity. Only 164 out of 603 students reported having an in-patient clinical experience in physical activity counseling. Of the 164 students who had an inpatient clinical experience, 85 reported having the opportunity to practice counseling. Even smaller numbers of students reported having an outpatient clinical experience, or additional opportunities involving

physical activity counseling. Despite having minimal opportunities in counseling, the majority of the students (74.2%) reported having partial to strong confidence in providing physical activity education. This finding may be explained by Bandura (137) who noted that if individuals perceive they are performing well, with no information to the contrary, their perceived self-efficacy may be higher than warranted. This may be of concern since only 48% of the student nurses in this study demonstrated knowledge that was consistent with the current physical activity guidelines, and therefore they could be providing patients with inaccurate information. As educators, it is vital to provide accurate information to the patient in order that the patient may utilize physical activity correctly to promote their health.

The accelerated second degree students had significantly more confidence ($p= .003$) in providing physical activity counseling than the traditional students. Knowledge of the guidelines was not significantly different ($p= .299$) for the two groups so the difference may lie in the students' previous experiences in life, maturity or other education not necessarily related to physical activity. For example, Wetta-Hall et al. evaluated smoking cessation counseling behaviors of nurses (153). It was determined that nurses with fewer years of experience were less likely to assess for tobacco use than nurses with more years of experience (≤years of experience (odds ratio (OR) 0.41, CI: 0.18-.093) $p =0.04$)). Accelerated students may have received counseling training or education on health-related behaviors in previous jobs or schooling. Further investigation of differences between programs would need to be explored further for these factors.

Also, self-engagement in exercise did influence the student's self-efficacy. Students who engaged in higher levels of physical activity exhibited more self-efficacy in counseling than most of those grouped into lower levels of physical activity.

5.5 UNDERGRADUATE UNLICENSED BACCALAUREATE STUDENT NURSES' BELIEFS IN EDUCATING PATIENTS RELATED TO PHYSICAL ACTIVITY

Providing accurate physical activity counseling is an important part of preventive health care, and improving the health of the American people. It is imperative that nursing students perceive the importance that increasing one's physical activity can have in the prevention of chronic disease and disability. When the students were questioned, physical activity counseling was perceived by the nursing students as having moderate priority, fourth in rank compared to nine other lifestyle behaviors requiring counseling. In contrast, a study performed in 1992 reported that 506 senior nursing students ranked physical activity 15th among 23 health promotion behaviors in importance (41). In this study, students ranked physical activity counseling 4th in priority among 9 other lifestyle behaviors with a healthy diet, smoking cessation and medical compliance as ranking higher in priority; whereas, acute care nurses who ranked the same lifestyle behaviors ranked physical activity counseling third in priority (32).

Only academic status and degree of student's self-engagement in physical activity affected the perception of the importance of physical activity counseling when compared to other lifestyle behaviors. Freshmen ranked physical activity counseling as higher (3.9 ± 2.2) in priority than both juniors (4.8 ± 2.2) and seniors (5.0 ± 2.4). Sophomores perceived physical activity counseling higher in importance (4.1 ± 2.2) than the seniors (5.0 ± 2.4). What is striking is that the importance in providing physical activity counseling was lowest at the senior level. This may be related to the increase in patient care responsibilities, or less emphasis on health promotion in the curriculum in the upper academic levels as previously suggested by the Lask (150).

Physical activity counseling was not perceived as being very important when compared to other nursing care responsibilities. Students ranked physical activity counseling 9th among

other nursing care responsibilities. The academic status of the student, the type of program, or their self-engagement in physical activity had no influence in their ranking of physical activity counseling. Similarly, in a study on acute care nurses, physical activity counseling was ranked approximately 9th and 10th in importance when weighed against patient care responsibilities (32). These results are not much different than previous findings when Williams found that when time is limited, nurses focused care on the patient's physiological needs before focusing on their psychosocial needs (154). In addition, in an observational study in which nurses were observed for nursing activities they performed, it was found that among the observed activities, counseling and education only occurred 2% of the time (155).

Personal lifestyle behaviors are purported to influence how nursing students perceive their role as health promoters. McCann et al. (156) and associates found that undergraduate nursing students who were non-smokers were more likely than smokers to agree that all health professionals should promote a healthy lifestyle. In this study, the level of personal engagement in physical activity by the student did influence the students' ranking of physical activity counseling when compared to other lifestyle counseling behaviors. Nursing students who engaged in high levels of exercise, greater than or equal to 300 minutes per week, perceived activity counseling to be higher in priority among other lifestyle behaviors than students who did not exercise, or those students who exercised at lower levels (75-149 minutes per week). Abramson, et al. noted a similar finding among physicians, that physicians who exercised regularly were more likely to counsel their patients on the benefits of physical activity (151). In contrast, Ingel found that personal engagement in physical activity by the nurse did not influence their prioritization of physical activity counseling (147). These inconsistent findings across

studies on the influence of personal physical activity engagement of nurses on their counseling patients on physical activity warrants further investigation.

5.6 UNDERGRADUATE UNLICENSED BACCALAUREATE STUDENT NURSES' BELIEF RELATED TO THE ROLE OF THE NURSE

Educating patients and families on disease management or prevention has traditionally been a role of the nurse. Since the 1980's, there has been a shift in the nursing curriculum from disease care to involving the nurse in health promotion (145). Student nurses in this study were questioned as to whether they believe counseling a patient in physical activity was part of the nurse's job, and 97.6% were in agreement with this being the role of a nurse. Academic status did influence the percentage of students who reported, 'yes' it is a nurse's job to provide physical activity counseling. Significantly higher percentages of both seniors (100%) and freshmen (99%) reported that it was the nurse's responsibility to counsel compared to sophomores (95%).

The type of program the student was enrolled in had no influence of the perception of the student that counseling on physical activity is a nurse's job. The influence of exercise on the percentage of students who felt it was the nurse's job to counsel trended toward significance ($p = .052$). However, the pattern of the findings are inconsistent based on self-reported physical activity, with no significant difference among the students who performed 75 minutes per week of exercise with the students who performed ≥ 300 minute per week of exercise. By comparison, in a prior study, no difference was found among nurses who regularly exercise and those that do not regularly exercise in their counseling of patients related to physical activity (147). However, McDowell et al. (157), who surveyed 220 practicing nurses regarding physical activity

counseling, found that there was a significant difference in physical activity counseling among nurses. Approximately 60% of those nurses who were regularly active, compared to 40% of those who were not regular exercisers, reported that they provided counseling related to physical activity ($p < 0.05$) (160). These inconsistencies concerning the influence of personal exercise on the nurse's role in providing physical activity counseling appears to warrant further investigation.

5.7 BARRIERS TO PHYSICAL ACTIVITY COUNSELING

Almost one-half of nursing students (47.1%) in this study perceived lack of time as the most significant barrier for the nurse that would limit counseling patients on physical activity. Lack of knowledge related to physical activity counseling was reported as a barrier by 25.5% of student nurses, and 18.1% of the student nurses reported that patients' lack of motivation to learn about physical activity was a barrier. However, few student nurses (7%) reported that self-efficacy for physical activity counseling was a significant barrier. By comparison, surveys of professional nurses have reported that they do not provide health promotion education because they lack time, knowledge about the physical activity guidelines as well as the risk reduction, and confidence in application of that knowledge to patient education (36-38). A small percentage of students (2%) also reported that lack of educational materials was a barrier to counseling, which is in contrast to findings by Douglas et al. (25), in which the most commonly reported barrier by nurses was lack of education materials for healthcare providers (reported by 46% of nurses), and lack of educational materials for patients (reported by 39% of nurses). These additional barriers may

require further evaluation for their impact on nurses providing physical activity counseling to patients.

5.8 LIMITATIONS AND FUTURE DIRECTIONS

The following limitations and future recommendations were noted, and should be considered for further research in this topic area:

1. This study only examined students from one baccalaureate program. The ability to generalize the findings will be limited to the school and program studied. Future studies should be conducted on nursing students from across a number of different nursing programs in an endeavor to have a more representative sample of nursing students.
2. This study only examined one type of registered nurse training program at a large university affiliated with a large academic medical center. Thus, it cannot be determined from this study if students from other types of nursing training programs would respond in a similar manner. Thus, future comparative studies on the different types of nurse training programs (Diploma school, Associate's degree) and its influence on their counseling patients on physical activity may provide further insight into how best to train nurses to take on the role of counseling patients related to physical activity.
3. This study did not query the students as to whether they perceived that there were gaps in their nursing program which influenced their responses to the questions on the survey. Thus, prior to modifications to nursing curricula to address the gaps identified by the results of this study, feedback from nursing students related to modifications to

coursework, or clinical experiences that would assist them in physical activity counseling of patients.

4. Data collected in this survey for measuring the student's personal engagement in physical activity was based on self-reporting. Self-reported data may be biased or misclassified due to possible errors in recall of behavior, errors in comprehension of questions, perceived cultural differences and beliefs about physical activity, and age discrepancies (154). This could have led to the inconsistencies noted in the influence of personal physical activity related to the student's self-efficacy in counseling, and their belief in the priority of physical activity counseling among other lifestyle behaviors. Validation of the findings could be the focus of future research, with consideration given to finding an objective assessment of a measure of the student's physical activity engagement.
5. The psychometric properties were not established for the survey used to collect the data in this study. In the future, a survey that has validity and reliability should be utilized, if available, to survey the students on physical activity counseling.
6. This study was not designed specifically to compare students in the traditional program versus the second degree program. Thus, there was a large disparity in the number of students included from the traditional program (N=493) versus the second degree program (N=45), and this may have affected the pattern of results. Future studies that seek to compare these different types of nursing programs with regard to physical activity knowledge and counseling should consider this potential discrepancy in the development and implementation of those studies.
7. The specific areas of the nursing curriculum that may have influenced the nursing students' responses on the survey were not examined in this study. Thus, conclusions and

recommendations with regards to how best to improve the nursing curriculum with regard to knowledge and counseling on physical activity would be speculative. Thus, further examination of the components of the nursing curriculum with regard to these factors warrants additional consideration.

5.9 CONCLUSION

Increasing the engagement of individuals in physical activity is considered to be an effective method in aiding individuals to maintain or improve their health. Multiple recommendations have been made for physical activity promotion to be included into the routine clinical practice of healthcare providers (6, 121,122). Nurses are the largest group within the professional health care occupations, and a major role of the nurse is to educate the patient on ways to restore or prevent illness and to promote health. Nurses are considered a credible source of health care advice by patients, and could play a pivotal role in educating people on ways to maintain health and avoid complications (28). As early as 1995, the American Nurses Association identified health promotion as a fundamental concept in nursing (145). In addition, nursing curriculum has been placing more emphasis on health promotion within the curriculum. However, studies investigating nurses related to physical activity counseling show only modest reporting of physical activity counseling (32,147, 157).

This study examined the undergraduate baccalaureate student nurses' knowledge, self-efficacy, beliefs and practices related to physical activity counseling. This study showed that 48% of the students would recommend to patients an amount of physical activity that is consistent with the current physical activity guidelines, which is at least 150 minutes of

moderate-to-vigorous intensity physical activity per week. However, self-efficacy for physical activity counseling was moderate-to-strong, despite reporting limited opportunities within their curriculum and training to engage in physical activity counseling. While 97% of the students reported that physical activity counseling was a responsibility of the nurse, the students also ranked physical activity 4th among 9 other lifestyle behaviors that require counseling, and prioritized physical activity counseling 9th when compared to other patient care responsibilities.

In addition, the academic status, the type of program the student is enrolled in (traditional, second degree accelerated), and the personal engagement in physical activity was examined for their influence on the student's knowledge of the physical activity guidelines, as well as the benefits of physical activity, the student's self-efficacy, and their beliefs and practices related to physical activity counseling.

The academic status of the student did influence the students' knowledge of the guidelines, their self-efficacy, beliefs and practices. The program in which the student was enrolled influenced self-efficacy, with students in the accelerated second degree program reporting more self-efficacy for physical activity counseling compared to students in the traditional nursing program. The nursing student's personal engagement in physical activity did significantly influence self-efficacy for physical activity counseling, and the priority given to physical activity counseling; however, the pattern of these findings was inconsistent.

Despite the well-documented health benefits of physical activity, this study suggests that nursing students have limited knowledge of the recommended amount of physical activity to elicit these health benefits. Moreover, understanding factors that influence nursing students' self-efficacy to counsel on physical activity, the priority they place on physical activity counseling compared to other lifestyle behaviors, and the priority they place on physical activity counseling

compared to other nursing responsibilities warrants further investigation. Health promotion is typically included within the baccalaureate nursing curriculum, but the results of this study suggest that modifications to nursing curricula may be required to enable the nursing student to gain better skills and experiences related to counseling patients on physical activity. The ability of future nurses to appropriately counsel patients on physical activity may have significant implications for health promotion efforts.

APPENDIX A

STUDENT LETTER

Dear Student Nurse:

This research study is being conducted by Doctoral Candidate Lucille Sowko, MSN, MEd, RN.

I would like to request your voluntary participation in the attached survey. The purpose of this research study is to evaluate all undergraduate unlicensed baccalaureate student nurses' ability to educate patients about physical activity. I am surveying all undergraduate unlicensed baccalaureate nursing students who are 18 years of age or older within the University of Pittsburgh's School of Nursing.

The survey consists of approximately 32 questions that should take about 10-15 minutes of your time to complete. The surveys will be numbered after all surveys are turned in. In addition, the surveys will be coded for year of training (i.e. freshman, sophomore, junior or senior) and type of program you are enrolled in (traditional or accelerated second degree). The data collected from this research study survey will not be reported individually, but rather in group form only. Strict confidentiality will be maintained for all responses, and results will be kept under lock and key. Your name will not be recorded at any time. Please do not sign the survey form. Once you have completed the survey, please place it back in the envelope it came in and place it in the designated collection container located on the desk in the front of the room.

Please return uncompleted surveys as well. All the surveys will be numbered, once all students have returned the survey to the designated collection container.

Once again, your participation is voluntary. Whether you participate or do not participate will not in any way affect your grade in this course or progression in the program. If you choose to participate, I would like to thank you for your time.

Sincerely,

Lucille Sowko PhD(c), MSN, MEd, RN

APPENDIX B

REQUEST TO THE PROFESSOR

Dear Professor (name),

My dissertation research will investigate the "Knowledge, Self-efficacy, Beliefs and Practices of Baccalaureate unlicensed student nurses related to Physical Activity Counseling. My sample will be all baccalaureate unlicensed undergraduate nursing students enrolled in the University of Pittsburgh's School of Nursing who are 18 years or older. The purpose of my research is to evaluate the student nurse's ability to educate individuals about physical activity. I have spoken with you earlier about conducting the survey within your class, and now I would like to formally request to utilize your class to conduct the survey at the end of the term. The survey will include questions that the student should be able to complete within 10 to 15 minutes. Your assistance in this matter would be greatly appreciated. If you have any questions about the research, please feel free to contact me at las9@pitt.edu.

Sincerely,

Lucille Sowko MSN, MEd

Doctoral Candidate

APPENDIX C

PHYSICAL ACTIVITY NURSE RESEARCH SURVEY

Instrument Number: 2 2 6

Shade circles like this: ●
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Please use BLACK Pen Only!

Study ID: 1 8 3

Physical Activity Student Nurse Research Survey

ID Number: _____ Administration Date: __ / __ / ____ (month) (day) (year)

(FOR STAFF USE ONLY)

1. In which nursing program are you currently enrolled?
   - O 1 Traditional Undergraduate
   - O 2 Second Degree Accelerated

2. What is your current status in the nursing program?
   - O 1 Freshman
   - O 2 Sophomore or first term Second Degree student
   - O 3 Junior or second term Second Degree Accelerated student
   - O 4 Senior or third term Second Degree Accelerated student

3. What is the highest educational level you have completed up to this point?
   - O 1 High School Diploma
   - O 2 Associates degree
   - O 3 Baccalaureate degree
   - O 4 Master's degree
   - O 5 PhD degree or EdD degree

4. Do you presently have a college degree?
   - O 1 Yes ——> a. Is it in a health-related field?
     - O 1 Yes ——> b. What field is it in?
       - O 1 Exercise Science, Exercise Physiology, Physical Activity
       - O 2 Nutrition and/or Dietetics
       - O 3 Other health-related field
       - *Please specify:* _____
     - O 2 No
   - O 2 No

(for office use only) __ __

5. Gender: O 1 Male O 2 Female

ID Number: _ _ _ _ _ _ _ _ _ _ _ (for internal use only)

Date: _ _ / _ _ / _ _ (for internal use only)

Study ID: 1 8 3

7. What is your race:

a. Do you consider yourself to be Hispanic or Latino, that is, of Mexican, Puerto Rican, Cuban, or of Latin American descent?

- O 1 Yes
- O 2 No
- O 3 Unknown

b. Please choose the one category that best applies to you . . . .

- O 1 White
- O 2 Black or African American
- O 3 American Indian; please specify: _____
- O 4 Alaska Native
- O 5 Native Hawaiian or other Pacific Islander
- O 6 Asian
- O 7 Other; please specify: _____
- O 8 Unknown

c. Are you of more than one racial/ethnic background?

- O 1 Yes ---------> Please specify all categories that apply to you . . . .
- O 2 No
- O 3 Unknown

(1)
- O 1 White
- O 2 Black or African American
- O 3 American Indian
- O 4 Alaska Native
- O 5 Native Hawaiian or other Pacific Islander
- O 6 Asian
- O 7 Other

8. Personal activity: Have you exercised *over the last 6 months*?

- O 1 Yes ------> a. Over the past 6 months, on average, how many days per week have you exercised for at least 20 minutes per day at moderate to vigorous intensity, which is an intensity that will increase heart rate and breathing and cause you to perspire or sweat (activity similar to brisk walking, jogging, cycling, aerobics, etc.)?
- O 2 No

(1)	(2)	(3)	(4)	(5)	(6)	(7)
O	O	O	O	O	O	O
1 day per week	2 days per week	3 days per week	4 days per week	5 days per week	6 days per week	7 days per week

b. On days that you exercise, on average, how many minutes each day do you exercise?

[ ][ ][ ] (minutes per day)

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ID Number: _ _ _ _ _ _ _ _ _ _ _ (for internal use only) Date: _ _ / _ _ / _ _ (for internal use only) Study ID: 1 8 3

9. When you personally DO NOT engage in exercise, what are the barriers that prevent you from engaging in exercise?
(Choose all that apply.)

(1)
O a. Lack of time to exercise
O b. Exercise is inconvenient
O c. Lack of motivation to exercise
O d. Unable to exercise due to health limitations
O e. Other; please specify: _____

(for office use only)

10. Have you had an in-patient training experience that involved counseling or educating patients as a component of your required academic program?

O 1 Yes ------> a. Within this required in-patient training experience, have you counseled or educated patients on physical activity or exercise?
O 2 No

O 1 Yes ------> b. Within this required in-patient training experience, on average, how many minutes per patient have you counseling or educating them on physical activity or exercise?
O 2 No

(minutes per patient)

11. Have you had an out-patient training experience that involved counseling or educating patients as a component of your required academic program?

O 1 Yes ------> a. Within this required out-patient training experience, have you counseled or educated patients on physical activity or exercise?
O 2 No

O 1 Yes ------> b. Within this required out-patient training experience, on average, how many minutes per patient have you spent counseling or educating them on physical activity or exercise?
O 2 No

(minutes per patient)

12. Have you had any additional in-patient or out-patient training experiences that were not required as a component of your academic training program that involved counseling or educating patients?

O 1 Yes ------> a. Within these additional experiences, have you counseled or educated patients on physical activity or exercise?
O 2 No

O 1 Yes ------> b. Within these additional experiences, on average, how many minutes per patient have you spent counseling or educating them on physical activity or exercise?
O 2 No

(minutes per patient)

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ID Number: _ _ _ _ _ _ _ _ _ _ _ (for internal use only) Date: _ _ / _ _ / _ _ (for internal use only) Study ID: 1 8 3

13. Have you observed other nurses counseling or educating patients on physical activity or exercise?

- O 1 I have not had the opportunity to observe other nurses.
- O 2 I have had the opportunity to observe other nurses, but, I have never observed them counsel patients on physical activity or exercise.
- O 3 I have had the opportunity to observe other nurses and I have sometimes observed them counsel patients on physical activity or exercise.
- O 4 I have had the opportunity to observe other nurses and I have often/frequently observed them counsel patients on physical activity or exercise.

14. Using the Likert Scale below, please indicate your level of agreement with the following statement:

"I am confident counseling patients related to physical activity."

1	2	3	4	5	6	7
O	O	O	O	O	O	O
Strongly Disagree			Partially Agree			Strongly Agree

15. The current Physical Activity Guidelines for Americans to promote and maintain health is to engage in aerobic physical activity of moderate intensity for how many minutes per week?

[ ][ ][ ] (minutes per week)

16. For which of the following conditions can physical activity/exercise be effective for prevention or treatment? (Choose all that apply.)

(1)
- O a. Early mortality
- O b. Cancer
- O c. Obesity
- O d. Stroke
- O e. Heart Disease
- O f. Diabetes
- O g. Pulmonary Disease
- O h. Depression

17. Do you think the role of a nurse should be to provide patients with education on the current physical activity public health guidelines?

- O 1 Yes
- O 2 No

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April 11, 2012

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ID Number: _ _ _ _ _ _ _ _ _ _ _ _
(for internal use only)

Date: _ _ / _ _ / _ _
(for internal use only)

Study ID: 1 8 3

18. Please rank the following lifestyle health-related behaviors in order of priority when you are counseling/educating a patient.

"1" is the most important and "10" is the least important.

Use each number only once in your rankings.

a. Physical activity	
b. Moderation with ETOH ingestion	
c. Smoking cessation	
d. Weight management	
e. Immunizations	
f. Adequate sleep	
g. Stress management	
h. Medical compliance	
i. Healthy diet	
j. Hand washing safety	

19. Please rank the following patient care responsibilities in order of priority when you are providing care to your patient.

"1" is the most important and "10" is the least important.

Use each number only once in your rankings.

a. Performing treatments	
b. Giving discharge instructions	
c. Documentation	
d. Checking physician's orders	
e. Counseling on physical activity	
f. Passing medications	
g. Explaining the daily plan of care	
h. Patient/family teaching	
i. Patient assessment	
j. Coordinating patient care	

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ID Number: _ _ _ _ _ _ _ _ _ _ _
(for internal use only)

Date: _ _ / _ _ / _ _
(for internal use only)

Study ID: 1 8 3

20. What do you perceive is the most significant barrier that nurses confront to counseling or educating patients on physical activity?

(for office use only)

21. Are there any additional barriers outside of the most significant barrier, that you perceive nurses confront to counseling or educating patients on physical activity?

(for office use only)

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